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W. F. Bradley, representative of THE AUTOMOBILE, meeting English Quakers back of the firing line in France

In the Wake of War

A Tour by Automobile Through the Devastation and Ruin Left by the Battle of the Marne

By W. F. Bradley

Special Representative of THE AUTOMOBILE with the *Allied Armies in France*

ONLY 20 miles to the east of the walls of Paris we reached the fringe of the battlefield. It has become customary to speak of that great encounter, in the early days of September, 1914, between the invading German forces and the allied French and British armies, as the Battle of the Marne. In reality it was a succession of battles, lasting 6 days, engaging between 2,000,000 and 3,000,000 men, and stretching over a front from the eastern suburbs of Paris to Verdun. Some of this front was in the Marne valley; but a considerable amount of the most bitter fighting was carried on many miles to the south of that river, and also some distance to the north.

The plan is now easy of comprehension. After sweeping through Belgium and later defeating the English and French armies in the north of France, the victorious Germans made practically a bee-line for Paris. When almost within striking distance of the capital, the direction of the German army was changed towards the southeast, evidently with the intention of crushing the forces under the command of General Joffre, then retreating towards the Seine, and later returning to take possession of an undefended Paris. But when the German forces occupied the 150-mile line of front between Paris and Verdun, General Joffre gave the order to advance. That advance is known as the Battle of the Marne. It drove the Germans back distances from 15 to 40 miles and doubtless decided the whole future conduct of the war.

We motored from Paris, along the south bank of the Marne, through pretty and hilly country which showed no trace of the gigantic struggle of 3 months previous. From the top of the hill leading to the town of Meaux, there is a fine bird's-eye view of a corner of the battlefield. From this point, in the early days of September, could be seen the line of the Paris army, facing east, its back to the capital, and also the French and British armies coming up from the south in their endeavor to drive the enemy across the Marne.

Meaux had so changed since our last visit, a couple of days after the battle, that we hardly recognized it. The bridge over the Marne, blown up by the English when they retreated south, had been replaced by a wooden structure. The wrecked motor truck which for several days had partly obstructed the road just beyond the bridge, had been removed. A few miles to the north, in the direction of Vareddes, there were still traces of the battle, but in Meaux itself the dirt, disorder, and wreckage which always accompany the passage of masses of troops had given way to cleanliness

and a well-ordered civic life. Meaux has a remembrance of anxious days and nights, but no visible battle scars.

At Trilport, 3 miles to the east of Meaux, the main road running almost due east and west crosses the river Marne by a high bridge. When the British retreated over this road they blew up the bridge, as well as the railroad bridge a few yards to the north over the same river. During the night following the destruction of the bridge a German automobile carrying officers rushed westward, coming down the slope leading to the bridge at a high rate of speed, and almost before the driver had time to realize that there was a gap ahead of him had made a 40-foot plunge into the Marne.

"I suppose they were all killed," we remarked to the French guard on duty at the temporary bridge.

"Well, they never came back to tell us how they felt," he drawled unemotionally.

"Any damage done about here?"

"None," he replied, then as an after thought remarked, "Of course they took our fowls, our rabbits and our pigs, especially the pigs. But what can you expect? It's war."

Leaving the main road immediately after Trilport and turning south, the extreme western point of the battle line was reached at Pierre-Levée. There had been some fighting in the neighborhood, but with the exception of missing telegraph poles nothing to indicate a struggle. The first and most westerly sign of the enemy's appearance is at the Ferme des Loges, an isolated group of buildings on the main road from Montreau to La Ferté-sous-Jouarre. The Germans billeted in the farm. When they found that they had to turn round and hurry away from Paris, so temptingly near, the farm buildings took fire—how, nobody knows; the charred walls remain as a grim souvenir of the invader's visit.

Wrecked Motor Vehicles

All the country south to Coulommiers, a thriving town noted for its cheeses, was traversed by the retreating Britishers and fought over when those same Britishers moved northward in their attack on the Germans, but it has little to show. It was a running fight carried out too rapidly for any great damage to be done to villages and townships. On one of the long, straight, well made highways north of Coulommiers the wrecks of German motor vehicles testified to the rapidity of the retreat. A Berlin motorbus lying in the ditch had its radiator riddled with shot; a metal staircase indicated that it had once been fitted with a double deck body. The magneto, carbureter, valves, valve caps, copper piping, etc., had been carried away by economical French or business minded Tommies, leaving nothing portable for the souvenir hunters. A few miles further east, the village of Chailly possessed a wrecked wineshop. In the sum total of the destruction caused by this war that wineshop is an almost negligible quantity. Yet it is typical.. The enemy's forces, tired with marching, but flushed with victory, swept down on sleepy Chailly, looted unprotected houses and burst open abandoned wine cellars. When the order came to flee before the advancing French, some drunken hand overturned a kerosene lamp or put a match to the bedding. A hard working French family returned a few days later to discover that their home was a heap of ashes.

Contrasts are vivid on the battlefields of the Marne. Chailly possessed the blackened walls of a wineshop and a few score of houses which could not show a bullet mark among them. La Ferté-Gaucher, although in the center of the battleline, had nothing more to report than pillaged shops. "But if you turn back 20 yards and run south to Courtacon," advised the sentinel on duty at the railroad crossing, "you will see some destruction." To attempt to get a complete and accurate history of every French village occupied by the enemy's forces would tax the ability of the most painstaking of historians. Roofless buildings, gaping window frames and ashes a foot deep tell the story in its broad outline, leaving it to the imagination to fill in the details. Generally the villagers have fled before the arrival of the enemy; when they have remained they are little inclined to talk. The voluble individual whose imagination and emotion call upon his hands, his shoulders and his tongue to give expression to the feelings within him is not the Frenchman we met on the battlefields of France.

It was a typical French farmer who explained to us that the home forces had just retreated a couple of miles to the south of Courtacon when the advance guard of the Germans came in and immediately set fire to many of the buildings. "The few men who had remained behind were all seized. A young man of 20 who was about to leave for the army was shot. They put me against that wall"—and he pointed to the charred remains of the gendarmerie—"telling me that it would be my turn next. Then they took me over the road there, keeping me under the bayonets for 4 hours. The Germans set fire to most of the buildings as soon as they arrived. The barns were filled with the recently gathered harvest; the corn smouldered for a week."

Montceau-les-Provins, the next village on the road to Esternay, had suffered in patches. On the left-hand side of the main road was a row of what had once been cottages. Opposite was a new stone built postoffice as smart and as spotless as if it had just been left by the builders and painters. The postman came out to explain that the shells had come diagonally across the road, destroying the cottages, but only breaking the windows of his house. The cottagers had sought refuge in the rabbit hutches at the rear of their gardens.

A Desolate Village

Before we ran into Esternay we were advised to climb up the hill side about half a mile to the village of Chatillon-sur-Morin. It was a bright, vigorous winter morning, with a snap in the air which sent the blood coursing through the veins and a cheery sun made nature beautiful in its barrenness. But the hand of death had been placed on Chatillon. We drove down the village street without seeing a living creature. We got out of the car to wander among ruins, to locate kitchens by the big soup pan hanging from an iron bar where the chimney had evidently once been, to note the site of barns by an extent of gray powder covering the ground for a depth of several inches, to discover the former position of sheds by bits of rusted American reapers. Presently a woman and a child appeared; their home was the only one not completely destroyed; a boy was discovered in a cellar putting chaff into sacks; a woman put her head round the doorpost of a cowshed; it was her home, as well as that of the cattle. A young man came out of the wreckage of the village Mairie. He was the only male in the place.

"You have suffered from the bombardment?" we queried.

"Fire," was his monosyllabic reply.

We suggested that it might be incendiary shells.

"Shells don't carry kerosene cans around with them; they don't soak mattresses, and they don't come back if the fire is not burning briskly."

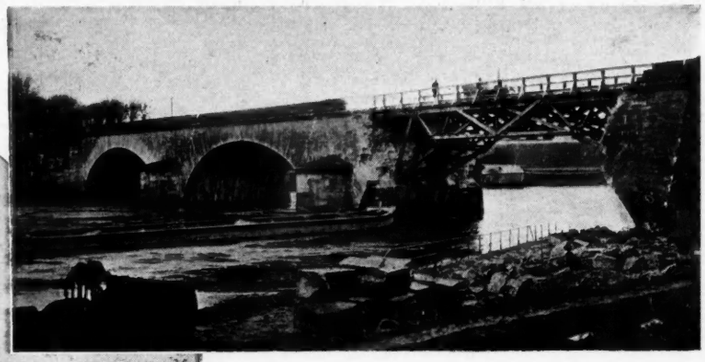
He spoke dispassionately, as a man who had seen too much destruction to be moved, and who had lived long enough in the atmosphere of battles to realize that fire and destruction were inevitable accompaniments of war.

Cattle Burned Alive

"They took possession of the village," he explained, "on September 6. The French had retreated a few miles further south; but they attacked the following day, and when the Germans realized that their quarters were untenable they set fire to everything. Nine horses were burned alive in that farm; a bull was burned across the road and six cows perished in those ruins at the end of the street."

"But they did no damage to Esternay," we objected.

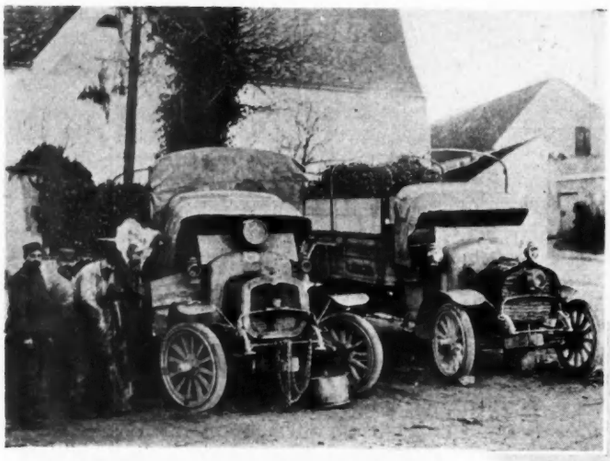
"Hadn't time," was his blunt reply.



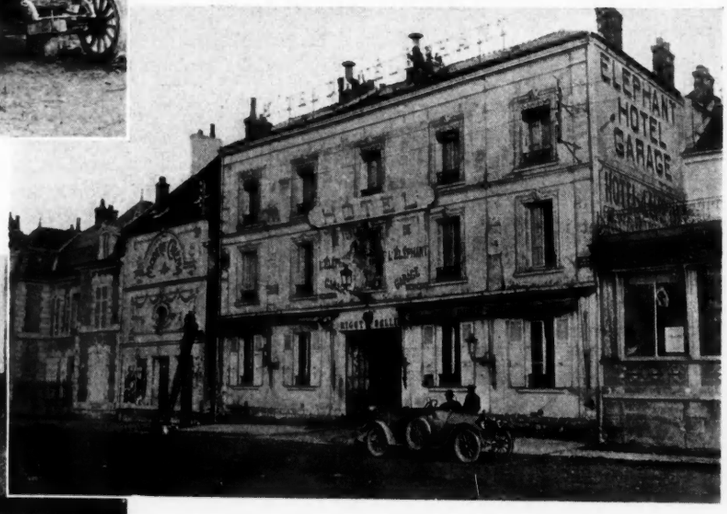
Bridge over the river Marne at Trilport. It was blown up by the English in their retreat. Shortly afterward a German officer's car plunged into the gap, a drop of 40 feet to the river below. Needless to say, none in the car escaped

Wreckage of the church of Reuves on the St. Gond marshes. It was on this plain that the French attacked and routed the Prussian guard. Note Bradley's car in foreground. It is doubtful if the church can ever be used again as a place of prayer and worship. Most of the houses in this town were hopelessly wrecked

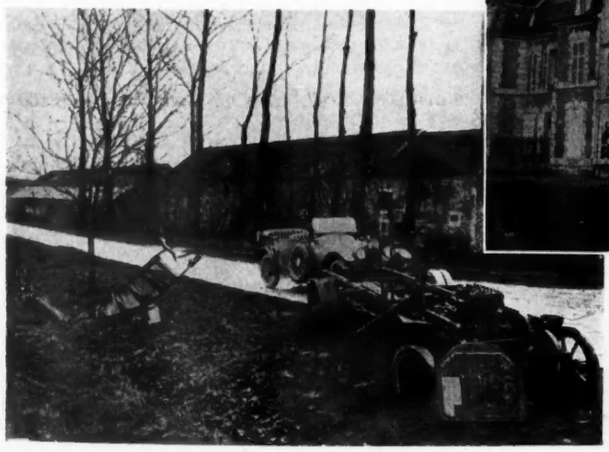
One of the direction boards placed on the route to the German frontier for the benefit of the aeroplane pilots of the allied armies, who are ceaselessly scouting about overhead



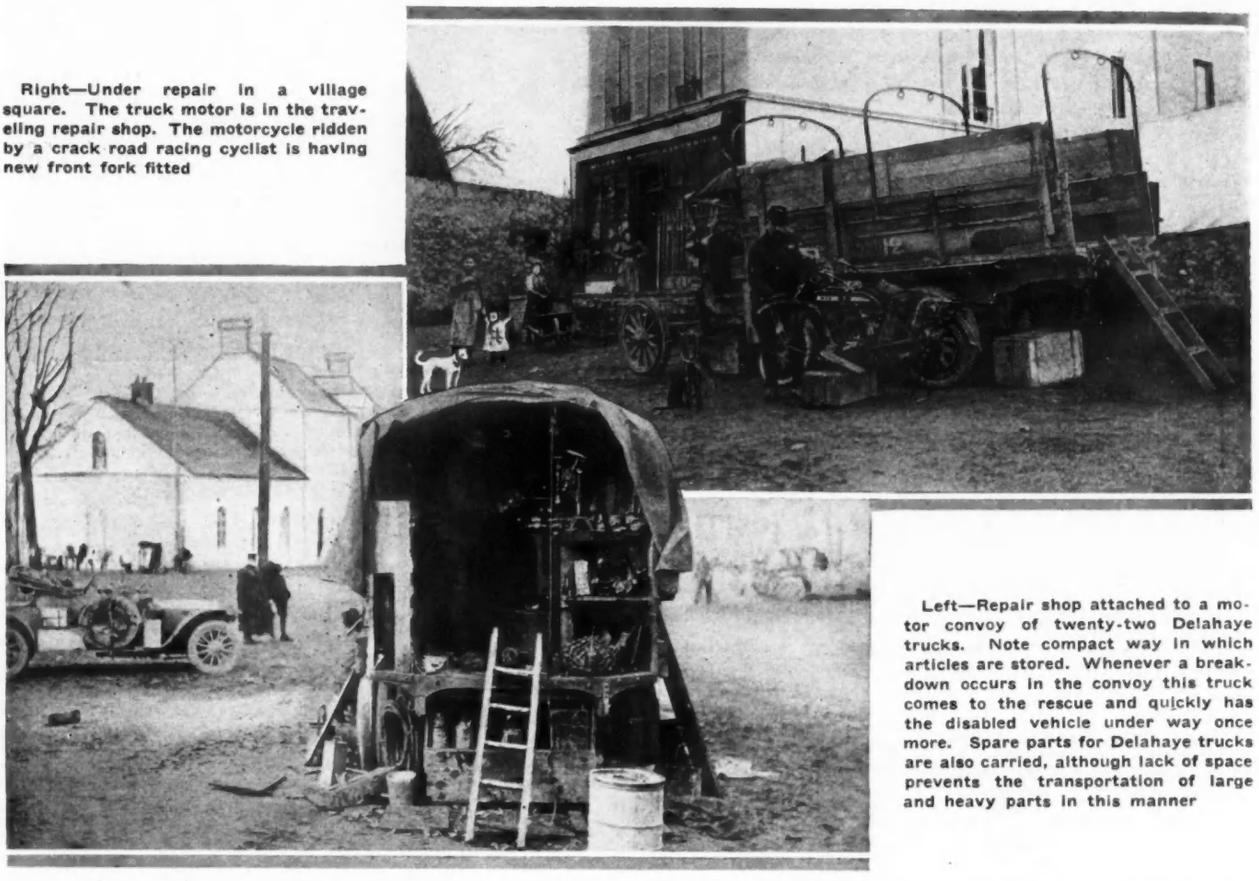
Two Delahaye trucks, of a convoy of twenty-two, carrying fodder to cavalry at the front. Note home-made dash and side doors



Above—Hotel de l'Elephant, the leading hostelry at Chateau-Thierry on the Marne. A German shell exploded in the front bedroom window the night of September 2, 1914



Left—Wreck of a Berlin motor bus which was overtaken by the English when they drove the Germans out of the Marne valley. Note radiator riddled with bullets and remains of iron staircase



Right—Under repair in a village square. The truck motor is in the traveling repair shop. The motorcycle ridden by a crack road racing cyclist is having new front fork fitted

Left—Repair shop attached to a motor convoy of twenty-two Delahaye trucks. Note compact way in which articles are stored. Whenever a breakdown occurs in the convoy this truck comes to the rescue and quickly has the disabled vehicle under way once more. Spare parts for Delahaye trucks are also carried, although lack of space prevents the transportation of large and heavy parts in this manner

Esternay, a village normally interested in wines, was the central as well as one of the most southern points of the 150-mile battle line from Paris to Verdun. To the east and west of this town the battle raged most fiercely, and it was here that the greatest number of men fell. As in the case of most of the larger towns in the Marne valley, Esternay suffered little damage. The proprietor of the Hotel de l'Union, a little man who interrupted a game of billiards he was playing with soldiers to greet us, supplied us with an excellent résumé of the German occupation.

"The Germans swarmed into the town on Saturday afternoon. They said: 'Tomorrow, Sunday, you work, we rest.' But when the boom of the French guns was heard on Sunday morning, the German officer remarked, 'Ah, French artillery—courageous.' They worked that Sunday, and on Monday morning they bolted without saying au revoir."

To get the spirit of the battle, 2 or 3 days should be spent wandering about the country between the north of the main road from Esternay to Vitry le Francois and the River Marne. It was within this country that the greatest shock of arms in the history of the world took place, and it is in the villages of this district and along the secondary roads of this neighborhood that signs of battle are most clearly discernible. Practically every village has some bombarded building or burned house; nearly every field has its harvest of blue compressed meat cans, its wine bottles, its splinters of shell, its empty cartridges and its graves defined by a plain wooden cross, by a soldier's hat, the butt end of a gun, a knapsack, or a sword. German graves are hard to discover.

Quakers Rebuild Homes

At Lenharrée, a village to the east of Fere Champenoise, an old man who had stayed behind during the whole of the fighting informed us that 500 Germans had been buried in the immediate neighborhood. It was only an estimate by a man who had seen but a few yards of the battlefield, but seen those few yards at very close range. Lenharrée had the misfortune to be built between the French and the German lines. It had once been an interesting, picturesque and prosperous village. It had lost its prosperity, for of the couple of hundred farms and farm buildings only half a dozen or so remained intact. Two English Quakers, young men of good family and education, were at work in a farm yard putting a roof on a wrecked kitchen. They were members of a party of about fifty who had quietly slipped over to France, had taken up saw, trowel and hammer, and without ostentation, without any self-advertisement, were repairing dwellings which were worth repairing and erecting shacks when the old home had been completely razed to the ground. There was not a paid worker among them; they were not professional joiners or builders, but they handled saw and trowel creditably; they brought their material up on touring cars; they lived in uncomfortable village inns, or they fitted up rough quarters for themselves in a hamlet where the war had left ruin and disease. They had no social intercourse; the day's work was all they asked.

At the back of the wrecked church of Lenharrée a line of trenches indicated the place where the French had dug themselves in on securing possession of the village. A few hundred yards away across the plain an ill defined line showed where the Germans had hastily entrenched themselves. "There are a dozen Germans buried there," said a peasant woman who had followed us through the churchyard to the trenches. She pointed to a plot of land which showed signs of having been freshly turned. "We found them in our cabbage patch; we needed the cabbages, but we don't need that piece of land for the present." Wooden crosses, or a stick with a kepi placed on it marked the resting place of French soldiers. But only the loose nature of the soil told where Germans had been put under a few inches of Mother

Earth. There were many patches of loose soil around that village.

10 Miles of Trenches

Trenches lined the whole of the 10 miles of road from Lenharrée, through Normee, Ecury and Morains into the flat country known as the Marais de Saint Gond, although rarely found on maps under that name. It was in this boggy country, traversed by very few and very narrow roads, that the French army surprised and routed the Prussian guard. At Mondemont, a village picturesquely placed on a hill and overlooking the boggy plain, General Von Bulow had his headquarters. The chateau of Mondemont, in which the general and his staff were quartered, was the scene of a bitter fight, and when finally abandoned was in a wrecked condition. The Germans sought to escape across this boggy plain, northwards towards the Marne. The few available roads were quickly congested and men and war material fell in large quantities into the hands of the French.

Losses were heavy in this neighborhood. On the road from Fere Champenoise to Sezanne, 4 miles west of the former town, the battle raged fiercely around the Ermitage farm. Graves in the fields around the farm told their story; but it was the farmer who supplied most of the details. It was on this road that the best of the German army had to meet the élite of the French when the latter were given the order to attack. "The road ran blood," declared the farmer, "and the house was like a shambles." He indicated a wood about a mile away, on the north side of the road. "It was there that we lost heavily. One of our regiments, the 245th infantry, marched into Fere Champenoise. The inhabitants were delighted that their town was to be protected, and in consequence received the troops with open arms, giving them wine to drink and thrusting upon them bottles of champagne. The regiment went to spend the night in the wood. Heavy with the wine they had drunk the sentries slept at their post, and in the early morning the Germans made a surprise attack. I had climbed into the hills to get a view of the battlefield when at daybreak I saw men without arms, without greatcoats and without hats rushing wildly into the open plain. Only 500 of the regiment escaped."

Little Emotion Displayed

One of the most surprising features of a tour in the war area is the lack of emotion displayed by the victims. Reuves, one of the villages on the Marshes of St. Gond, had suffered heavily from the German fire. It is doubtful if its church could ever again be used as a place of prayer and meditation. It would be cheaper to abandon more than half the houses, rather than attempt to repair them. But both men and material were lacking for the work of reconstruction, and in consequence the women and the old men left behind had made a clearing in the rubbish and fitted a flimsy roof where two walls still retained a certain degree of solidity. It was from one of these homes that a bright-eyed, sturdy old woman came forth to look at us. Un-uniformed automobilists were somewhat of a curiosity in this neighborhood a couple of months after the battle.

"You have suffered severely, madame," we remarked.

"Why yes; there is plenty of damage here. But what can you expect? It's war. Some are worse off than I. Some have nothing; we have half a roof. It's enough to make me happy in my misfortune."

Champguyon, another village in this neighborhood. attracted us by reason of its battered condition, and the voices of women induced us to step out of the car and seek information. They were three in number, an old woman who talked much, a vigorous, intelligent-looking, middle-aged woman who was on her knees washing clothes in a pond, and a young woman, obviously the daughter, kneeling by her side, engaged in the same labor. Their cottages and outbuildings on the opposite side of the court had been destroyed by fire; the blackened walls revealed that fact. We opened conversation by asking how the village had been destroyed.

"By fire, monsieur; Oh, quel malheur (what misfortune)" replied the old woman.

We learned that the Germans had come, there had been a little fighting, and at the same time the village had burst into flames. Nobody ever knew exactly how a village had been set on fire. A week later the German troops came through again, marching northwards this time, and traveling too fast to fight. The old woman talked wildly:

"I went to find the priest, and I said to him, 'Monsieur le Curé, how is it such a misfortune has befallen me?' Brochard always said it was my fault, and if I had not gone away my Eugene would not have been lost. But what could I do? The sergeant said he would turn us all out of the cart if we did not come on quick, and Eugene would go back for his bicycle."

"Then your son has been taken prisoner?" we interposed.

"No, monsieur, they shot him; shot him there against the church." She hastily brushed a tear away, the first tear to accompany the many similar stories we had listened to in our tour.

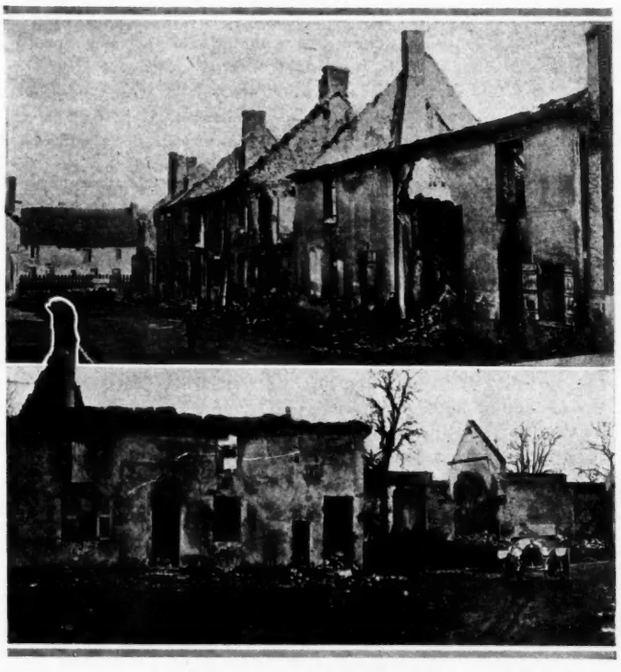
"But they shot three others," timidly stated the young woman. And she mentioned the names of three men.

"Yes, but two of those were silly, and probably they did not reply properly to the German questions," apologized the mother.

"But my Eugene was not silly, and they shot him. They caught him there," pointing to the orchard behind us. "Eugene hit the officer in the face; they fastened his hands behind his back and took him away in an automobile. Brochard says it was my fault. And I said to the priest, 'Monsieur le Curé, why has such a calamity fallen on me?' "

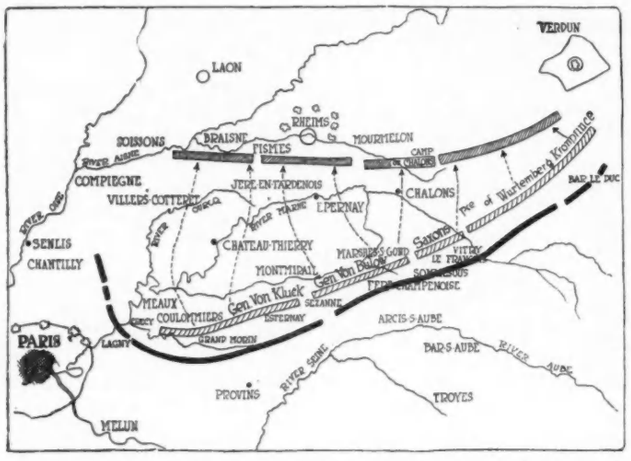
Being less capable of replying to her inquiry than was the village priest, we hurried away.

In conversation with a cafe proprietor, we had been informed that when the Germans came to the town of Epernay they imposed a war indemnity of 180,000 francs. But an



Upper—A view of the lower portion of Port à'Binson, destroyed by German incendiary shells

Lower—Soudan, in the Marne. Alleging that shots were fired by civilians, the German general staff ordered this village to be razed to the ground. The illustration shows the resulting ruin



How the allied and German forces were opposed before and after the battle of the Marne. The black line shows the positions of the allied troops while the slightly shaded sections indicate the German position before the battle, their later positions being indicated by the arrows and the more heavily shaded portions

Epernay doctor having saved the life of a German prince, the enemy refunded the whole of the amount as an expression of their gratitude. It was the kind of story to send a newspaper man sprinting to the telegraph office. But as the telegraph clerk would not have accepted any message until it had been censored, we decided to take advantage of our presence in Epernay to obtain details from the mayor of that town. In this way we learned something of the life of an important and prosperous town during military invasion.

Epernay—A Hospital Center

The advance forces of the German army entered Epernay on the afternoon of September, Baron Von Plettenberg being in command. The majority of the inhabitants had fled at the approach of the enemy's troops, and before doing so had shut off their gas, water and electricity supply. The mayor of Epernay, Pol Roger, was brought before the commanding officer and told that he would be hanged if the electric current was not switched on immediately. It was possible to meet the German demand. Nevertheless, the mayor and three of his assistants were arrested and kept as hostages in the city hall while the German officers dined at the best hotel in town. Fire broke out in the town during the evening; this incident bringing forth a threat that the mayor would be shot if a similar event occurred. The following day the life of the mayor was again in danger, for a German soldier had been shot in the leg by some unknown person, and Pol Roger was threatened with death if the culprit was not forthcoming. The intervention of General Von Teichmann prevented this threat being carried to execution. Later the mayor was brought before the German officers to answer the charge of having allowed the German flaw flying over the station to be replaced by the French tricolor. The town was threatened with a heavy war indemnity. It was proved that a German flag had never been hoisted over the station, and to repair this defect the town authorities were ordered to make a German flag and attach it to the flagstaff above the city hall. If a hand was laid on it the mayor would be shot, and the town pillaged and burned, declared the commanding officer. With a French flag and a janitor's apron, a German flag was manufactured and nailed to the flagstaff over the city hall, the window being nailed up by the mayor to prevent any person tearing it down. The German troops needed canned foods, but as Epernay's specialty is champagne, it was unable to meet the demand. In consequence, a war indemnity of 176,550 francs was imposed and paid, this amount representing the value of the food stuffs the town had failed to furnish. In making the calculation the French franc had been counted at 80 centimes.

When the German forces came in contact with the French army south of the town, Epernay became an important hospital center. The head doctor of the city hospital had fled at the approach of the enemy; his assistant had followed his example. But Dr. Veron, although 69 years of age, and retired from practice, displayed the energy of a man of 30 and devoted himself so disinterestedly to the 800 German wounded in the establishment that the general staff decided to refund the whole of the war indemnity before leaving the town. Epernay was saved; its important champagne cellars were untouched, its public buildings undamaged; only the bridges over the Marne were blown up to hinder the French advance. Individual citizens declared that their houses had been pillaged, but this does not prevent Epernay occupying the unique position of having undergone a German occupation without the loss of a cent and without the disfigurement of a public building.

There are few signs of war along the main road from Epernay to Chateau-Thierry. It is an agreeable run, with the river Marne on the right and vineyards from time to time, but with the exception of the lower portion of Port à Binson destroyed by incendiary shells, and an occasional soldier's grave marked by a plain cross, there are few indications that vast armies crossed the river by the various bridges, first chasing south, then fighting northward.

Tragedy Where Hill-Climb Was Held

Years ago, when the ability of automobiles to get up main road gradients might be open to doubt, Chateau-Thierry had a sporting reputation as a hill-climbing center. That hill, starting from the edge of the Marne and winding its way up the steep bank, was the scene of a tragic occurrence during the night of September 2 to 3.

For several days previous hordes of Belgian refugees, pushing their meager belongings on all kinds of vehicles, had swarmed through Chateau-Thierry. They were followed by civilians from the northern provinces of France, then by the Belgian army, then by the French army and a small portion of the British troops. The sight of the retreating armies sent the civilians fleeing in terror. A small body of territorial troops probably 200 strong, waited to meet the dense masses of the German army. They had not received definite orders to retreat, and they would not run away. The resistance was as effective as that of a brood of chickens opposed to a steam roller. Eighty of the men were shot down on the Soissons road and the huge German war machine swept on without stopping to drag the bodies to the side of the road. All night long artillery trains, motor trucks, touring cars, infantry and cavalry, rolled and tramped over that corpse-lined road. We were introduced to the town official who removed the bodies the following morning. "We scraped the road," he remarked significantly.

All Automobile Traffic Stopped

When the natives were fleeing from Chateau-Thierry, the authorities decided that all automobile traffic should be stopped. Civilians who owned cars were unable to make use of them to get to a place of safety, for soldiers barred their passage over the river and along the roads leading out of town. German officers appreciated this kindly attention on the part of the French civil authorities. They were somewhat less appreciative of the offer of a neighboring farmer that he should drive his own horse. The German army wanted the horse, not the man; but as the man insisted that the horse would never do good service in the hands of strangers, he was at last allowed to accompany it. The man disappeared from the life of Chateau-Thierry. He was looked upon as dead when, after an absence of 2 months, news was received that he had been made a prisoner of war in Russia.

Report on British Lamp Standards

Engineering Standards Committee Fixes Dimensions for Tungsten Filament Glow Lamps

TUNGSTEN filament glow lamps, vacuum type, for automobiles which purport to be in accordance with the British standards shall comply with the following recommendations and with the particulars shown in Figs. 1-10.

Tungsten filament glow lamps for the following purposes in connection with automobiles are dealt with in this report: head lights, side lights, tail lights, dash lights, dome lights and festoon lights, for interior lighting.

The standard voltages for tungsten glow lamps for automobiles shall be 6 volts and 12 volts.

For head lights and side lights the bulbs shall be spherical with pip, Figs. 1-4, while for tail and dash lights and dome lights the bulbs shall be pipless, Figs. 5 and 6.

No recommendation is made as to the form of filaments to be employed.

The sectional committee on automobile parts was appointed by the main committee at their meeting on July 18, 1912, and for the purpose of dealing with the various details in connection with the standardization of the automobile parts referred to them, ten sub-committees were formed upon each of which additional members having special knowledge of the matters to be dealt with were co-opted.

Sub-committee M on tungsten filament glow lamps for automobiles, which was responsible for drafting this report, was formed at a later date, having been appointed at the meeting of the sectional committee held on May 4, 1914.

The question of standards for tungsten filament glow lamps for automobiles was referred to the engineering standards committee by the Society of Motor Manufacturers and Traders, and in drawing up their recommendations the sub-committee were able to avail themselves of the report submitted by the accessories section of the society as the result of the work undertaken by a sub-committee appointed by that section, and they were also assisted by some further proposals which were put forward by a committee of the Tungsten Filament Lamp Manufacturers' Assn.

The lamps dealt with are intended to have an approximate efficiency of 1 watt per candle and the description "Vacuum" type is used throughout this report in order to distinguish them from the new "gas-filled" or "half-watt" lamps which have been recently introduced. It is intended to increase the scope of this report to cover the lattr type of lamp when further progress has been made with their manufacture, and at the same time to deal with the tolerances to be allowed on the lamp cap dimensions.

The question of whether electric glow lamps should be rated by candlepower or by watts is engaging the attention of the sectional electrical committee, but as it is desirable to issue the recommendations on tungsten filament glow lamps for automobiles with as little delay as possible, the designation "Actual Watts or Nominal Candlepower," used in the present report, is put forward without prejudice to any decision which may ultimately be come to by the sectional electrical committee.

This report was adopted by the sectional committee on automobile parts in December, 1914.

This report was approved by the main committee at their meeting on December 11, 1914.

Position of Filament

For head lights, Figs. 1 and 2, the distance from the bulb side of the bayonet pins to the center of the filament shall be 30 mm.

For side, tail and dash lights, Figs. 3, 4 and 5, the center of the filament shall be approximately in the center of the bulb.

For dome and festoon lights, Figs. 6 and 7, no recommendations are made.

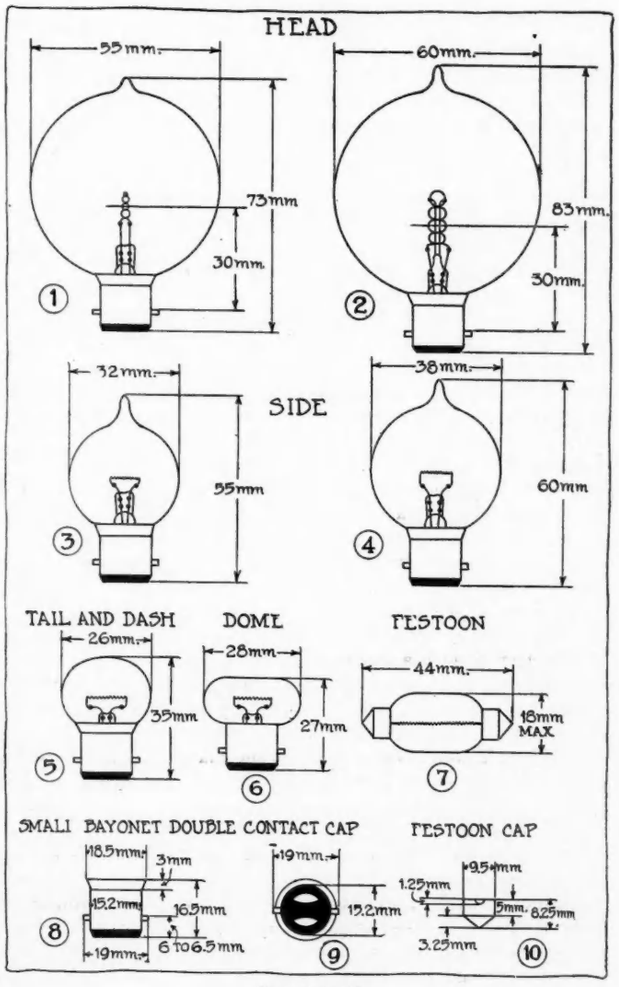
It has not been thought possible to recommend a definite standard in lamp efficiency in view of the fact that improvements in manufacture are constantly taking place, but for the purpose of estimating the nominal candlepower of the lamps dealt with, the lamp efficiency has been taken as 1 watt per British candle.

Lamp Caps

One standard small bayonet double contact lamp cap, Figs. 8 and 9, shall be adopted for all head lights, side lights, tail and dash lights, and shall comply with the dimensions given in Figs. 8 and 9.

In the case of the dome lights, which are intended for interior lighting, the cap, see Fig. 6, shall be of the same dimensions as for head lights except that the flange portion next to the bulb is omitted owing to the restricted total depth from contact to the top of the bulb. This does not interfere with the fit of the lamp into the holder.

The dimensions for the lamp cap for festoon lights are given in Fig. 10.



Figs. 1 to 10

50,000 Cars for Iowa in 1915

Prosperity Predicts Big Car Sales—1914 Crops and Live Stock Worth Over $1,000,000,000—Des Moines Show a Success

By C. G. Sinsabaugh

DES MOINES, IA., March 13—Iowa farmers contributed a billion dollars to the general wealth of the great Hawkeye state as a result of the bumper crops of 1914 and the boast is made and not questioned that the state's pocketbook could show $8,000,000,000 on appraisal, taking into account its rich farm lands, its live stock and its manufacturing interests. Its wealth per capita, figuring on farm wealth alone, is $1,682, while a rough estimate would give complete returns of at least $3,500 per head.

Because of these evidences of wealth it would not seem impossible that the Hawkeyes will buy at least 50,000 cars during the present year, according to a careful estimate made by Secretary of State Allen, who takes a keen interest in motoring affairs and is justly proud of the fact that Iowa ranks sixth in the United States in the ownership of cars.

To Distribute 20,000 Cars

And it is because of this great prosperity, tangible and not imaginary, that the 1,500 dealers who attended the sixth annual Des Moines show, which closed this evening, have gone home elated over the prospect. Most of them spent the week here, and as a result it is predicted tonight that Des Moines alone will distribute at least 20,000 cars in 1915 throughout the territory controlled by this city. This territory extends approximately to the Missouri line and also radiates in other directions. Sioux City looks after the northwest section of the state, while Omaha and Lincoln, Neb., claim jurisdiction to within 100 miles of Des Moines on the west.

As a show, the Des Moines affair was a great success. There were twenty-four members of the association displaying their goods, while six not holding franchises in the local body were allotted space. Forty-four makes of passenger cars were shown, while the accessories also had good space. Then, too, the car manufacturers of the country, learning their lesson at Kansas City when few attended despite the great demand for cars, as pointed out recently by THE AUTOMOBILE, were well represented here. President Bull of the Case company, President Jewett of the Paige, President Ford of the Saxon, Vice-President McDonald of the Moon, and General Manager Olwell of the Chalmers were among the big men of the industry who personally attended the show. In addition, dealers' dinners were given by Studebaker, Chalmers, Paige and Overland, so that quite a national tinge was given show week.

In addition there was a convention of thresher men here this week, which brought in an additional 2,000. And it was found that these thresher men are interested in automobiles and that they found time outside of their own convention to attend the show and inspect the cars.

So much for the show itself. Now for the 1914 returns which point the way to a big business for the industry—a dollar-mark confetti that should put Iowa among the motoring leaders of the country by the end of 1915. Let us first of all take up the Hawkeyes' resources and show why it will be possible to sell 50,000 new cars in the state before the end of the year and make good the prediction of the secretary of state.

$465,509,163 in Crops

Getting down to bald facts, which are backed up mainly by government reports, we find that the returns on December 1, 1914, show the total value of soil products in 1914, which include corn, oats, wheat, barley, rye, flax, hay, etc., to be $465,509,163, as against $438,157,163 in 1913. Corn, of course, is Iowa's best crop, this cereal's value totaling $200,029,280 for the yield of 263,689,600 bushels.

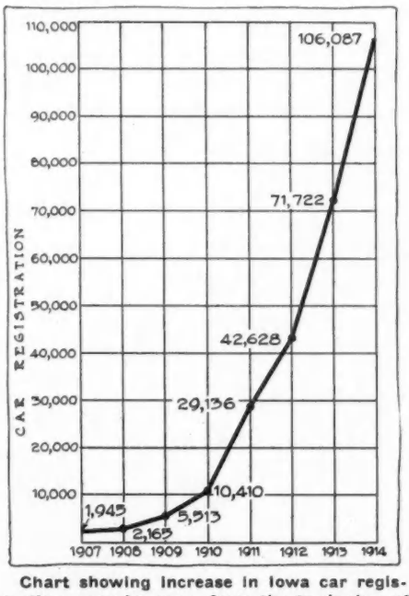


Chart showing increase in Iowa car registration, year by year, from the beginning of 1907 to the end of 1914

An even greater contributor to the state purse was the live stock, the value of which was $470,271,700 on January 1, as against $456,453,900 on the preceding New Year's day. When the count was made less than 3 months ago, Iowa farmers owned 1,600,000 horses, 58,000 mules, 1,377,000 milch cows, 2,683,000 other cattle, 1,249,000 sheep and 8,720,000 swine.

Still later returns from the weather bureau of the United States Department of Agriculture, announced March 1, show that on that date the farmers of Iowa had in their granaries, and ready to convert into money at any time, 3,010,000 bushels of wheat at $1.37 a bushel, as against 4,264,000 at 79 cents a year ago; 140,000,000 bushels of 65-cent corn, as against 125,171,000 56-cent corn in 1914; 61,000,000 bushels of 50-cent oats, as against 67,260,000 bushels at 34 cents in March, 1914; and 2,060,000 bushels of 68-cent barley, as against 2,300,000 bushels at 52 cents a year ago.

While these returns show that the farmers had less grain on hand March 1, 1915, than they had on the same date in 1914, yet the value was much greater. At the prevailing rates this year, this supply of grain would be worth $124,014,500, as against $94,571,106 12 months before. Of course, the European war has been largely responsible for this, but just the same this represents money, part of which will buy cars.

217,044 Farmers in Iowa

Iowa is particularly proud of the fact that it leads all other states in the production of corn, oats and hay. The 1914 yield of corn, 389,424,000 bushels, was worth $194,712,000, with Illinois second with 300,034,000 bushels. Iowa had 165,000,000 bushels of oats, worth $67,650,000, while its hay yield of 4,071,000 tons was valued at $323,953,000.

So much for the crops. Now let us take up the selling possibilities among the rural inhabitants and we will find

just why the secretary of state thinks that Iowa will absorb 50,000 new cars this year. Again referring to the statistics, we find that in Iowa there are 217,044 farms averaging 156 acres each, and that there are 33,930,000 acres devoted to farming. There are 217,044 farmers in the state.

Now we swing for a moment from farm statistics to the state house, where we consult the statistics of the secretary of state, who tells us that in 1914 there were 106,087 cars registered during the year. All of these, of course, did not come from the rural district—probably three-quarters of them—so that it will be seen that the field has hardly been scratched so far as the farmer and the automobile are concerned. Inasmuch as it is freely admitted that the time is not far distant when each farmer must own at least one car, not counting tractors or commercial vehicles, we find that seemingly there are at least 150,000 tillers of the soil in the Hawkeye state who can be listed as prospects.

Sixth in Registration

With such an outlook, it is small wonder that Iowa has climbed so high on the registration ladder. It now ranks sixth among the commonwealths, having added 34,241 cars during 1914, but it is the proud boast of R. M. Williams, in charge of the automobile registrations, that Iowa has conducted this department at a lower percentage of operating cost than any other state. It also ranks fourth in the amount of fees collected from registrations. Also, Williams points out that Iowa registered 1,119 more cars in 1914 than the combined registrations of Colorado, Florida, Idaho, Kansas, South Dakota, North Dakota and Montana. To be exact, Iowa added 35,241 names in 1914. To quote the report:

State	Cars Registered	Fees	Operating Expense Per Cent.
New York	168,223	$1,529,852.36	20
Illinois	131,140	699,725.30	....
California	123,504	1,338,785.25	11.6
Ohio	122,348	685,000.00	11.8
Pennsylvania	110,963	1,184,645.50	6.9
Iowa	106,087	1,040,135.54	5.6
Massachusetts	77,246	922,469.75	13
Michigan	76,014	183,169.30	36
Indiana	66,500	430,307.55	11.1
Wisconsin	53,160	293,580.00	8
Missouri	50,998	235,873.50	43

These figures come as near being official as it is possible to get them. Mr. Williams compiled them after corresponding with other states, even going so far as to telegraph several times to stir up those which had been slow in replying. This work was undertaken to prove the economical operation of the office in Iowa. Of the $1,040,135.54 collected, Iowa spent $58,382.68 to tag the cars, of which amount $22,665.91 was spent for the plates alone. Supplies, printing, stamps, etc., used up $25,516.17; the regular employees $7,600 and the extra help $2,600.

Iowa estimates that 60 per cent. of its registrations come from the farmers and also reports that there are 38,000 Fords in the state. Also the secretary shows with pride the growth in car registrations. In 1907 the count showed 1,945 cars; in 1908, 2,165; 1909, 5,513; 1910, 10,410; 1911, 29,136; 1912, 42,628; 1913, 71,722; 1914, 106,087. Figuring at an average of $1,000 per car, Iowa at present owns more than $100,000,000 worth of power-propelled vehicles.

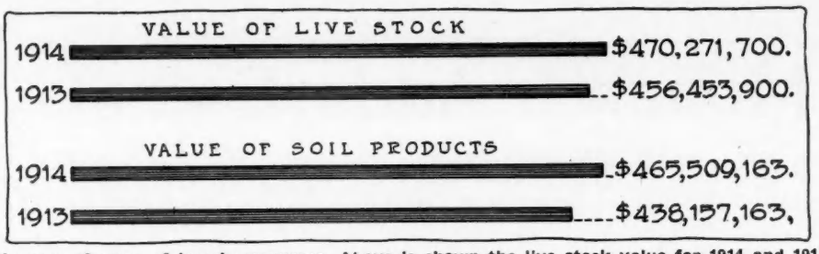


Diagram of some of Iowa's resources. Above is shown the live stock value for 1914 and 1913 and below the values of the crops for the 2 years are compared

The Hawkeyes spend most of the registration fees on the roads. According to the law, 85 per cent. goes direct into the highways, 8 per cent. goes to the highway commission, and the remainder is used to maintain the automobile regulation department of the secretary of state.

$11,000,000 for Roads

With all this motoring enthusiasm it goes without saying that the Hawkeyes are great good-roads boosters. They spent $11,000,000 on the roads last year, $850,000 of which came out of the registration funds. Probably no other state in the union has so many different cross-state routes, each of which is kept in apple-pie order. Crossing east and west we have the River-to-River road, from Dubuque to Council Bluffs, 337 miles; the Great White Way, paralleling it, 412 miles; the Blue Grass trail, from Burlington to Council Bluffs; the Hawkeye trail, from Dubuque to Sioux City; and the North Iowa pike, from McGregor to Sioux Falls, S. D., among the leaders.

Running north and south there are the Red Ball route from Burlington to Minneapolis; the Interstate trail from Kansas City to Minneapolis, and the Ayrline route also connecting Kansas City and Minneapolis.

Boosters for Iowa have statistics at their fingers' ends to prove why their state is the greatest in the union. In addition to what has been told in the foregoing they say:

Burlington has the largest furniture factory in the United States.

Muscatine has the largest food products plant in the United States.

Dubuque has the largest millwork establishment in the United States.

Charles City has the largest traction engine factory in the United States.

Fort Dodge has the largest wall plaster and mortar board factory in the United States.

Waterloo has the largest cream separator factory in the United States.

Ames has the largest plant for the manufacture of felt pennants in the United States.

Iowa City has the second largest jewelry manufacturing business in the United States.

Ottumwa has the largest plant for the production of hay-working machinery in the United States and the largest independent pork-packing plant in the United States.

Des Moines has the largest burial casket and hearse manufacturing plant, the largest independent cement plant, the largest paving producing plant, the largest plant for the manufacture of women's ready-to-wear wool garments, the largest egg-desiccating plant, the largest roofing tile plants and the largest patent medicine plant in the United States.

In Iowa there are 3,434 general stores, 2,675 grocery stores, 1,706 banks, 1,047 implement dealers' stores, 709 clothing stores, 375 dry goods stores, 1,053 shoe stores, 1,091 furniture dealers' stores, 1,076 milliners, 813 jewelers, and approximately 2,000 motor car dealers.

There are 1,400 postoffices in Iowa. There are only seventeen towns of over 10,000 inhabitants and one of over 50,000.

The per capita wealth is almost 50 per cent. greater than the average for the United States.

The number of manufacturing establishments in Iowa is reported in the 1910 census as 5,528, with an average number of wage earners of 61,635, ranking twenty-ninth among the States of the Union in this respect; value of manufactured product, $259,238,000; value added by manufacture, $88,531,000, ranking twenty-second in this respect.

Capital to the amount of $171,219,000 is employed, the salaries amount to $10,972,000, the wages to $32,542,000, the material cost, $170,707,000.

Having absorbed all these figures, one's respect for Iowa increases materially and one can readily foresee the great future ahead for the automobile industry. The 2,000 dealers all report a great business.

Bankers Favorable

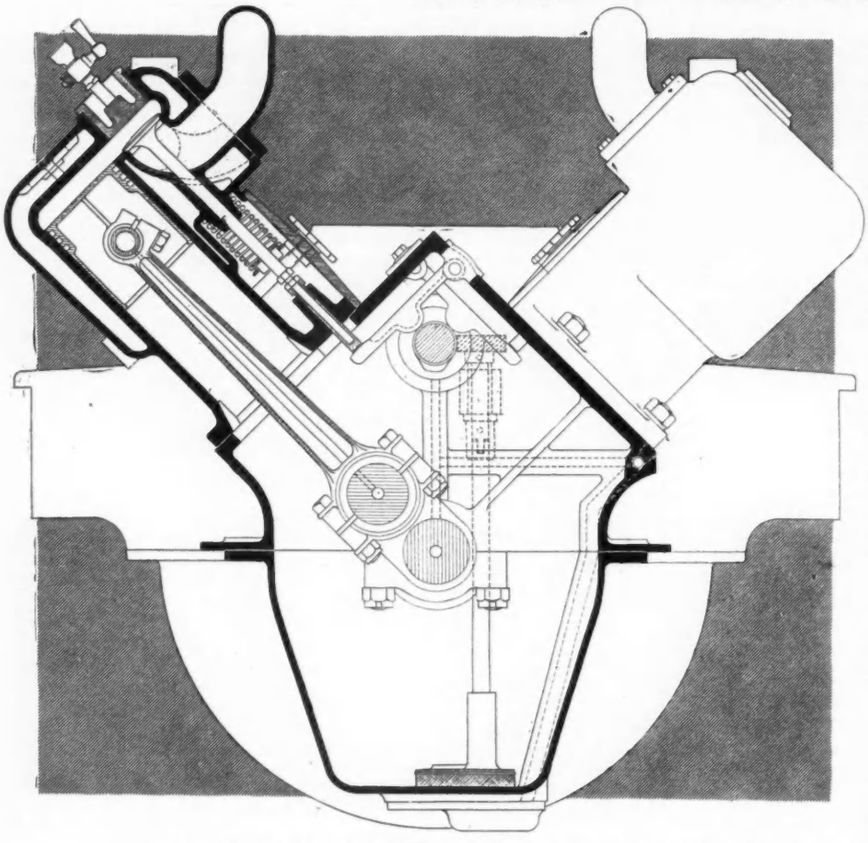
Leading distributors also say that bankers are looking more kindly on the automobile business than last fall, when the feeling existed that the moneyed interests were somewhat antagonistic and were refusing to loan farmers money with which to buy cars.

Jitneys in Des Moines

Des Moines is trying out the jitney. There are forty-three of these buses running at the present time, but it is declared they are not meeting with much favor. The city council is considering an ordinance which will fix the fares, name the routes and determine the terminal points, and require bus owners to give bond to "pay for any damage caused by their carelessness or negligence."

Monarch Adds Eight-Cylinder Model

Herschell-Spillman Motor Interchangeable with Continental Six in Same Chassis



Section through Herschell-Spillman eight-cylinder motor used in Monarch

THE Monarch Motor Car Co., Detroit, Mich., will bring out an eight-cylinder model at $1,500 as an addition to the six-cylinder at $1,250. The new car has the same chassis as that of the six, the two motors being practically the same in overall dimensions. When the chassis was first designed, commendable foresight was evidenced in building it so as to take an eight-cylinder V form of engine should it be felt later that the alternative was desirable. To this end the construction admits of the added power of the new engine, while being exceedingly light, and the result is that the ratio of weight to power, considering the use of either the Continental six-cylinder engine or the Herschell-Spillman eight-cylinder design, is such that unusual economy, speed and pulling qualities are claimed.

While the chassis of the eight is the same, mechanically, as the six, the body has more refinement, is somewhat better finished and boasts of full leather upholstery. Its general appearance, however, is much the same as the six, with which it easily might be confused at first glance.

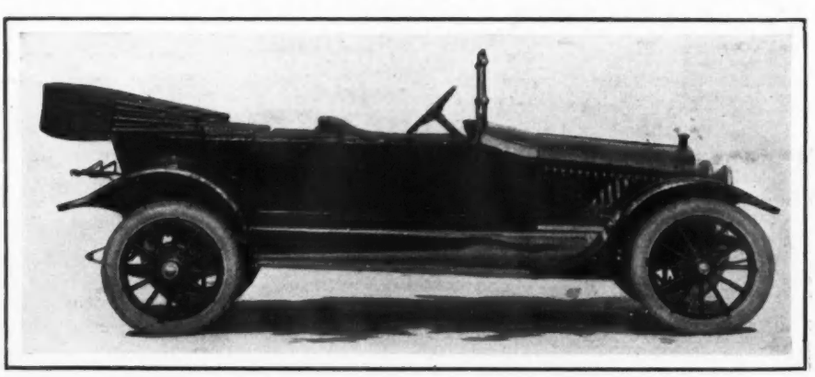
The Herschell-Spillman motor is the latest of its type and has a bore and stroke of 3 inches to 5 inches; it incorporates the gearset in unit. The design of the engine has been described in detail in a recent issue, and it will be remembered that the chief distinction between it and most of the other eights is in the method of attaching the connecting-rods to the crankshaft; since, instead of using the yoke-end construction, the rods are placed side-by-side on the same crankpin. Consequently, the two cylinder blocks are staggered with respect to one another by an amount corresponding to the width of the connecting-rod lower bearings.

The S. A. E. rating of the motor is 28.8 horsepower and it weighs 550 pounds, exclusive of the gearset. Other features are the double pump cooling and pressure feed lubrication. The chassis has 125-inch wheelbase, has three-quarter floating Salisbury rear axle, three-speed gearset, elliptic rear springs, left drive and 33 by 4-inch tires.

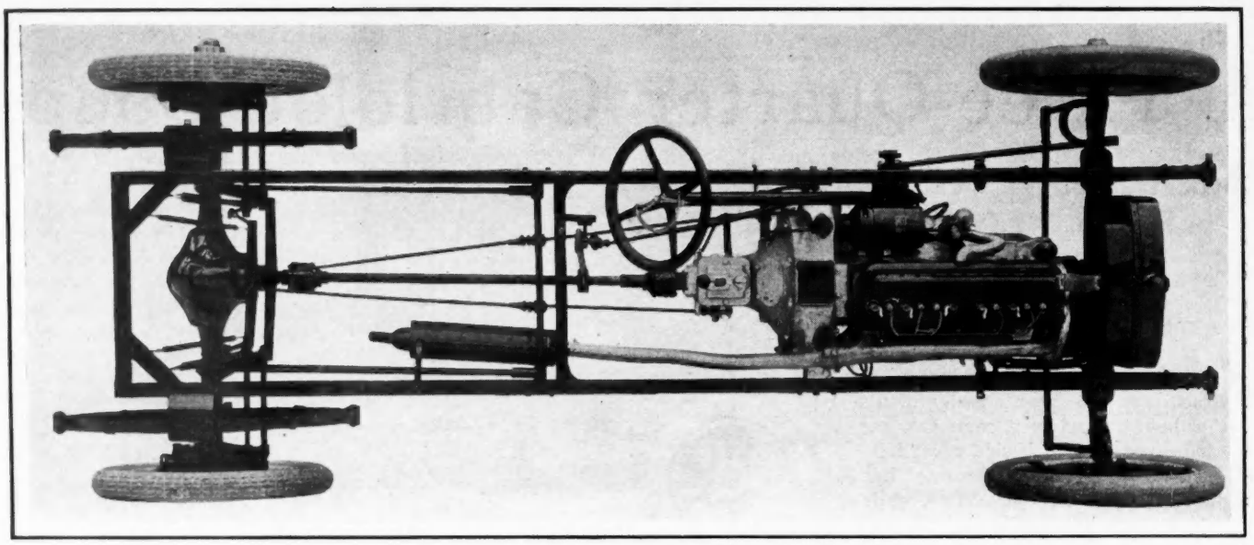
The six-cylinder Continental motor which also fits to this chassis is an L-head block-cast type with 3 1-2-inch bore and a stroke of 5 inches, the S. A. E. rating being 29.5 horsepower. The ignition in this case is Atwater Kent, while starting and lighting are provided for by a Ward Leonard system with drive through the flywheel for starting, the Bendix apparatus making the temporary connection. As with the eight, the three-speed gearset is in unit with the engine.

In taking up the details of the eight-cylinder motor's construction, it is to be noted that it follows generally accepted practice. The aluminum crankcase is common to both blocks of cylinders and is split horizontally in line with the main bearings. The lower part forms the oil reservoir, while the mountings for both crankshaft and camshaft are in the main or upper portion. The camshaft is placed directly above the crankshaft and is driven by spiral gears.

A double water pump is driven by a cross-shaft, also



Side view of Monarch six. Eight-cylinder motor is interchangeable in same chassis

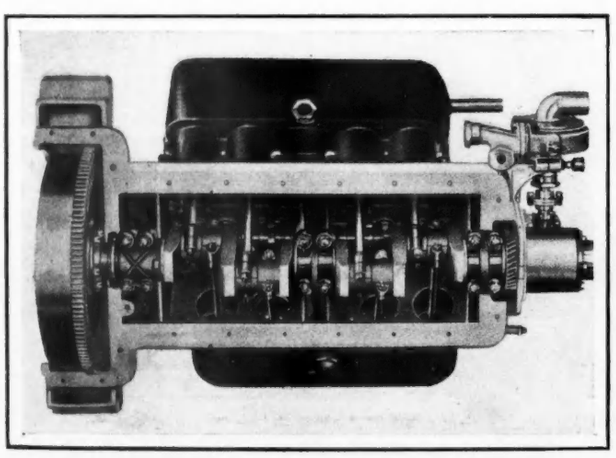


Plan view of Monarch chassis showing six-cylinder motor. Eight-cylinder motor fits the same chassis

through spiral gear connection with the crankshaft and an aluminum cover at the front of the engine houses all the gearing in compact shape. On the other end of the cross-shaft is the generator of the Ward Leonard two-unit electric system, the starting motor being attached to the left side, and drives through the Bendix.

In this engine, special attention has been given to the cooling system, the circulation being maintained by the double centrifugal pump already mentioned, one portion of the pump maintaining circulation in one set of cylinders while the other takes care of the opposite block. The pump has two discharges and separate pipes connect with each cylinder set, and the return path of the water is provided for by four outlets from each block of cylinders. These openings are opposite each exhaust valve and, in order to maintain as uniform a temperature as possible, at each exhaust valve, the size of the openings has been determined with the thought of making the temperature constant at all outlet points. Each cylinder is completely surrounded by the cooling water, there being a 1-2 inch jacket space between.

Oiling is by pressure entirely, with the minimum 10 pounds per square inch and the maximum 40 pounds, under extreme conditions. Located in the bottom of the crankcase the gear pump is beneath the oil level and it is driven by a vertical shaft operated by spiral gear connection with the camshaft. A horizontal passage in the crankcase leads the oil to the bearings through individual branches; thus taking care of the camshaft bearings as well as the crankshaft. Through 1-4-inch holes drilled in the arms of the crankshaft throws, the oil passes from the main bearings to the lower connecting-rod bearings and thence through tubes attached to the connecting-rods, it runs to the wristpins. A relief valve allows the discharge of oil to the timing gears, and from them it eventually finds its way back to the reservoir.



Bottom view of eight-cylinder motor showing side-by-side method of attaching connecting rods to crankshaft

Camshaft and crankshaft are each mounted on three bearings and the single camshaft has sixteen integral cams, this making a rather interesting job considering the offset of one set of cylinders with respect to the other. Main crankshaft bearing sizes are: front and center, 2 by 3 inches, diameter and length, respectively, and rear, 2 by 3 3-4 inches. The pistons are 3 1-2 inches long and have three rings each 3-16 inch wide, and the wristpin bearings are 7-8 inch diameter by 1 7-8 inches in length. Valves are of conventional design also, and have carbon steel stems welded to nickel-steel heads, their clear opening being 1 3-8 inches and lift 11-32 inch.

The timing is the same as that of other eights on the market and the firing order the same for each set of cylinders as it would be if that set alone were working. That is, it is 1-3-4-2 for each side, with No. 1 cylinder on one side following No. 1 on the opposite side.

The bell-housing forming the attachment for the gearset behind the flywheel is in accordance with standard S. A. E. dimensions, being of the form in which there is an integral arm running from either side to the frame as the rear support for the power plant. It should be remembered that in these Monarch cars, the same design from the clutch backwards holds, regardless of the power unit. The clutch is a Hartford cone with spring inserts to aid in easy engagement; behind and housed with it, in the usual unit-power plant fashion, is the compactly designed gearset with provision for center control. There are the customary three forward speeds and reverse, obtained selectively. An open propeller shaft is used, having a joint at either end.

The rear springs being elliptic, elaborate precautions have been taken to free them from any driving stresses, since there are two torque and radius members located just within the side rails of the frame on either side.

A streamline form of body is fitted with all the little refinements that make for grace of outline, and the standard color is a dark blue. Individual front seats with a passage between them for access to the rear portion of the body are supplied in according with the modern trend.

A Three-Quarter Cabriolet Coupé

Three Passenger Design for Moderate-Priced Made-to-Order Jobs

By George J. Mercer

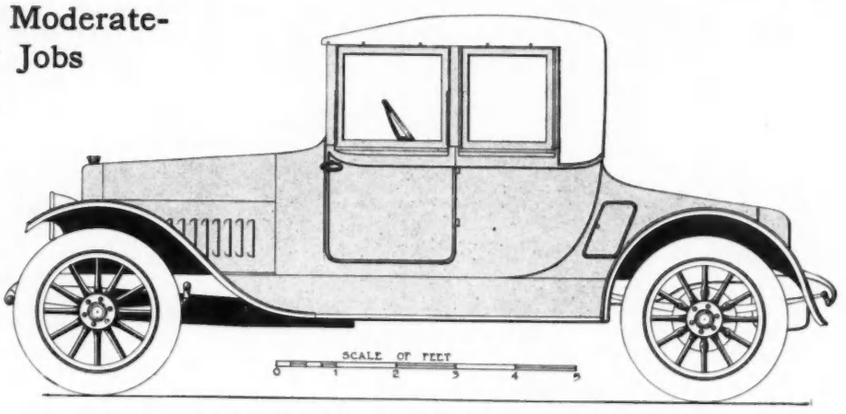


Fig. 1—Three-quarter cabriolet coupé on 122-inch chassis. Note compartment at rear

CABRIOLET coupés have become so popular recently that they are carried as stock bodies by many car manufacturers. This type is really an all-weather body and, since it came out, has been improved, the flush side effect having been accentuated and the cowl line blending better with the hood line, while the folding arrangement of the top and the fasteners is now on a sensible working basis. Staggered seats are used to some extent and, by having the body slightly wider, seating for three persons can be provided. The closed-in leather quarter still remains, however, though purchasers are continually asking about the practicability of having a window in its place.

With the larger bodies it is necessary to have a quarter window, but with the small two-passenger bodies, the operation of folding the top must be simple and the fixtures automatic in adjusting themselves. The design herein illustrated has fixtures having all these features and besides it is comparatively inexpensive to make, a most necessary condition, in order that it may be used on moderate-priced bodies of the made-to-order variety, where one or two bodies are made up at a time.

For Left Drive Chassis

Fig. 1 shows the completed body design mounted on a left drive chassis with 122-inch wheelbase, the tank being at the rear and the tires 34 by 4.5. The frame has the kick-up at the rear for spring clearance and is low hung forward. Some users like the privacy that the closed quarter affords, but the majority want all the window space possible. In this design the windows are large and are made to drop level with the body line when down; in addition the usual outside top joints have been dispensed with and the body has the clean exterior appearance of the permanent-roof job. Seating accommodations are for three on staggered seats and the compartment at the rear has space to store two extra tires, these being pushed in from the rear end, and there are small doors on the sides for access to the space in front when the tires are in place.

Fig. 4 shows the detail of the top construction and Fig. 5 is a side view and plan of the hinge that operates the folding of the toprail. In Fig. 4 the top is shown in both up and down position, one dotted and the other in solid lines, while the arrows show the line of travel from one position to the other. A is the permanent front partition that supports the windshield; B B are the windows, which drop completely out of sight when lowered; C C are the flappers that support the door windows when up, and the arrows indicate the folding movement; D is the pillar that supports the toprail and quarter window and folds toward the rear; E E is the toprail and F is the cut, the hinge for this point being formed by the scissors G G which are explained in detail in Fig. 5. The toprail rests on D and is secured from slipping by a dowel pin on the pillar that engages in a plate in the rail. At the front the toprail is locked to the pillar A, by a fastener that is operated inside the body. At the rear the toprail is connected to the pillar J by the hinge H and this pillar has a regular landau hinge at the bottom cut while the pillar D is hinged at I.

Scissors Bow Hinge

Fig. 5 shows the detail of the scissors bow hinge G G and the two views X and Y are the side elevation and plan, enough of the top framing being included to illustrate the manner of the folding operation and the method of fastening. The scissors hinge is formed of 9-16-inch round c. r. steel and each member is continuous from one side to the other of the

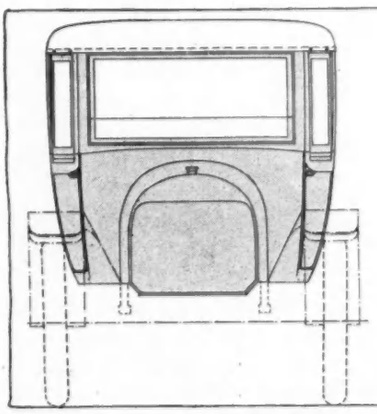


Fig. 2—Front view of the design

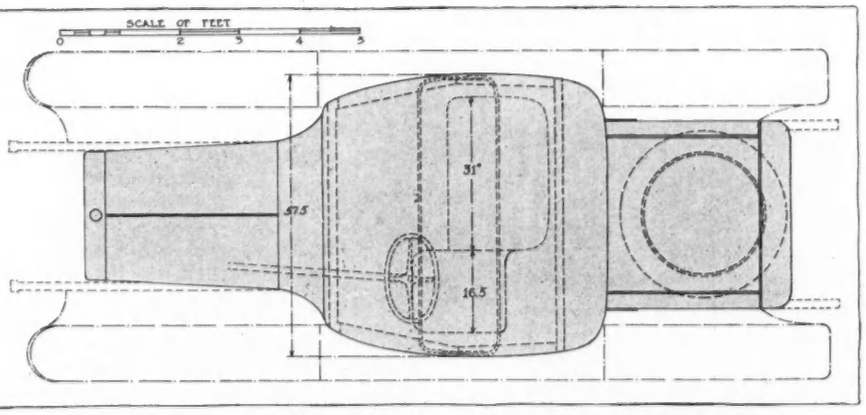


Fig. 3—Plan view, with principal dimensions. Note staggered seating and spare tire

body and forms the support of bow of the roof leather, each end being flattened as shown in the upper view, Fig. 5, and to make them pair they are flattened from opposite sides and riveted at L, while the ends form another hinge with the plate M M. These plates are forgings, the flat part being 1 inch wide by 3-16 inch thick, and the knuckle, milled to receive the end of G, is riveted at this point. M is let in flush in the toprail E and fastened with wood screws. G G is bent at the lower end half the width of the stock, so that when folded it will lie compactly and the space between the sections E E will be only 9-16 inch or the thickness of one iron, the forward member G folding inside the rear one as indicated by the arrow V, at the right of the lower view, Fig. 5. The forward member E is indicated in dotted lines folded on the rear member and the two sections of G are indicated in the space between the members E E.

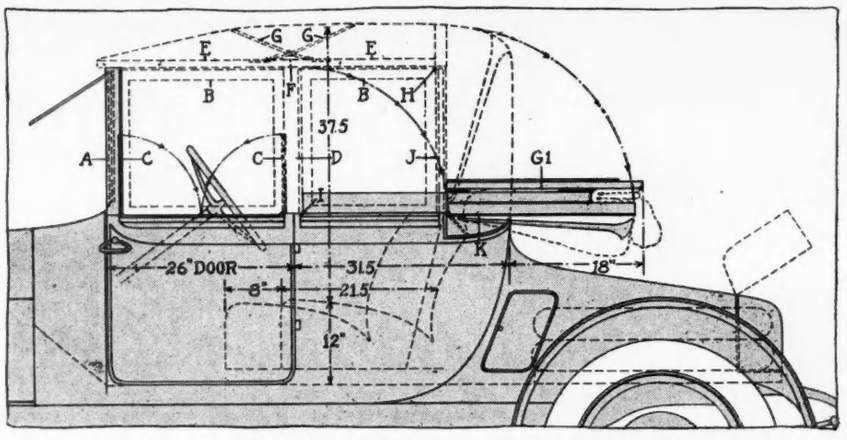


Fig. 4.—Detail of top construction, showing method of folding

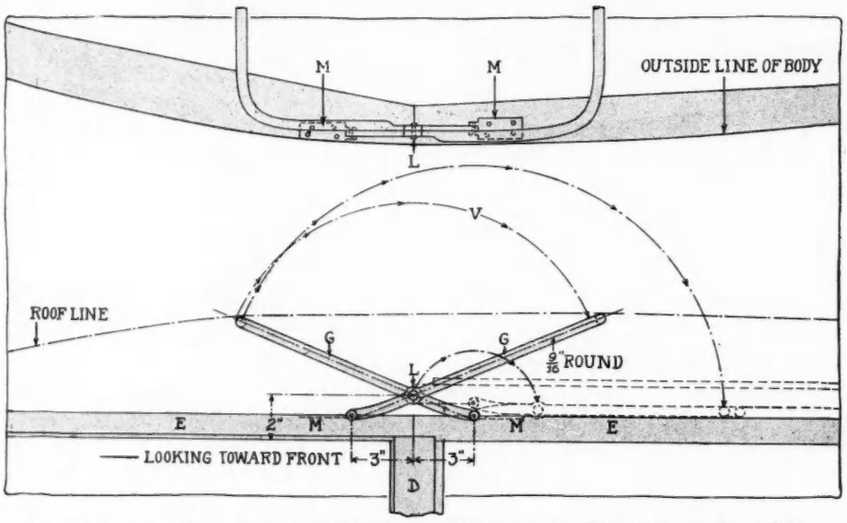


Fig. 5—Upper—Plan view of scissors bow hinge. Lower—Elevation of the scissors bow hinge

Folding the Top

When folding the top down, the first operation is to release the button fasteners that secure the top goods to the toprail, then release the lock at A, Fig. 4, and raise the toprail until it disengages itself from the dowel pin at D, when the pillar J will fall horizontal and rest on the block K. This block extends horizontally from the cut on pillar J to the back bar and the trimming inside finishes along its top edge. There is no top lining inside the bows on this design, permitting this block to be used for a top rest. The toprail is folded flat on J by means of the hinge H and the forward part of the toprail revolves back by means of the scissors hinge so that the members fall as shown in the full lines. The scissors show at G-1, Fig. 4, and the bow part is well back of the body and way beyond the chance of interfering with the seating. D is then revolved on I and the flappers C C are turned down on the doors, the only upright member being the front partition A. The top falls flat, there being no folds of top goods between, the top leather being fastened permanently to the roof frame only at the extreme front, on the top of the back bow and along the back line of J up to a point equal with H, so that the goods fall outside the framing, as illustrated.

Constructional Details

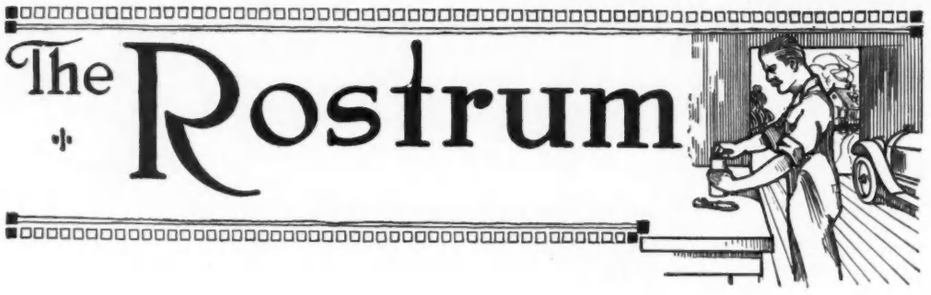
The windshield is divided, the upper part being the visor and the lower part forms a ventilator, the door is wide and free passage is allowed to the seats from either side without raising them. In the rear compartment all the doors lock and the door at the back is shown in its open-position in dotted lines, the extra tires indicated by dotted lines and the space forward of the tires is used for small articles that can be taken in and out of the sidedoors.

The construction of this body, assuming that it is to be a single order, would best be carried out with combination steel and aluminum panels. Wood for the framing and top should be used in all cases with 16 gauge aluminum sheet hammered to the proper shape for the body and cowl panels. The rear part can be all steel, the side and top panel being joined under a moulding as shown in Fig. 3 and the rear door, while more difficult to construct of steel will be stiffer and worth the extra labor. As illustrated, Fig. 3, the cowl is concaved from the hood to the front of the door where it is flattened for a short space to allow for the lap of the door moulding, and also to prevent the opening under the moulding from being too noticeable from the front. This flat space is shown by the perpendicular line in front of the door, Figs. 1 and 2.

Wood frames are used for the windows, on account of using flappers for supports on the doors. Wood is natural finish, either mahogany or walnut, with interior finish mouldings to match. Trimming material can be either cloth or leather, preferably the former, and the quarter window can have a curtain, in which case the curtain silk and carpet will match the material used in color. One electric reading lamp may be secured at the center of the back bow and pockets on the doors are in order.

Style of Trimming

The style of trimming is to have soft cushions and backs with few buttons in either, the absence of laces is marked and the borders are finished with welts of the trimming material not over 3-4 inch wide. Lift straps for the windows are of the goods material and the ends disappear either in the glass runway or in pockets in the trimming. The top is of leather and faced on the under side with imitation morocco. This is close to the leather and the framing and bows show beneath, where they are either covered with the same material or painted dull black, in which case the wood garnish mouldings and the window frames will be painted to match.



Is Cranking by Hand Becoming a Lost Art

EDITOR THE AUTOMOBILE:—In these days of self-starters, cranking by hand is fast becoming a lost art. It would seem at first glance that the subject were so simple that no explanation could be made of it. Such, however, is not the case, for the writer has several times helped persons who were not only unfamiliar with cranking but did not know how to apply the hand crank to their self-starting machines that failed on account of no electricity or no compressed air. The first usual mistake made by the beginner is the failure to properly engage the cranking lever before turning. He then stands directly over the crank, holding the crank handle firmly between his thumb and forefinger, preparing himself for a mighty heave down to the right hand. If the spark is well retarded and the crank lever properly engaged, the motor will probably start off in good shape and the novice operator will be very proud of his first attempt. "There is many a slip twixt the cup and the lip" and a crank that has not been properly engaged will slip at the first heave, allowing the operator to fall down to the crank's low position. The operator will still retain a firm hold on the crank handle, which, suddenly stopping at the bottom position, will strain or sprain his right thumb. In the meantime the operator's head, which started right over the radiator, has bumped the radiator, probably making a nasty cut over a left eye or some other part of the head. It is no uncommon sight to see a motor of an automobile running with nobody near the car for the simple reason that the operator is afraid to crank his machine because of an experience similar to the one quoted being fresh in his memory. If, in the above case the operator had had his spark well advanced instead of well retarded, and his cranking lever had been properly engaged, the compression cylinder would have fired just as the greatest pressure was vertically exerted on the crankhandle. The engine would have kicked back, either breaking the bones of the right wrist by direct telescoping or by flying out of the operator's hand, making a complete circle, and breaking his wrist by slapping it on its back. If the cranking lever be held in the left hand and pulled up from the left after being engaged, the slipping of the lever will obviously result in no damage to the operator, and should the engine kick back the crank handle will be jerked out of the operator's hand flying around hitting his fleshy forearm, not breaking it due to the flesh cushion. When it is necessary to spin the motor with the right hand the operator should grasp the crankhandle in such a way as to have his arm as far from the vertical as his strength will allow. This position not only lessens the danger from kicking back, but makes the following up of the cranking lever easier.

A broken arm spoils the usual pleasure derived from a car for about 2 months, and a sprained right thumb will be found to be very annoying when handling tools and adjusting parts as necessary.

U. S. S. New Jersey. A. S. KIBBEE

Ford Hard to Start When Warm

Editor THE AUTOMOBILE:—Would like to have you tell me why I have trouble in starting my 1914 Ford when warm? Several times I have had to get help from some one who could spin it. Spinning always starts it but this I am unable to do. It always starts readily if thrown into high when rolling down a grade. It runs well when started.

Some have suggested that I have batteries put on; others a Master vibrator, while easier starting is claimed for the Atwater Kent and other advertised ignition systems for Ford cars. Would any of these things help me or can you suggest something else?

When the motor is cold I have little trouble in starting unless weather is quite cold.

Lakeport, N. H. M. P. B.

—The fact that you have no trouble in starting the motor when cold would indicate immediately that the trouble is probably not in the ignition system. If you will try a slightly richer mixture on the carbureter it may relieve the trouble. Another possible cause is that the valves may be adjusted too close so that when cold they close but when warm there is an air leak that dilutes the mixture. Carbon trouble also acts this way at times and if the motor has not been cleaned out lately it is suggested that the carbon be removed. Another possible feature which does come under the head of ignition is that the dry batteries may be weak.

Mystery Motor Was Motorboat Type

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for February 18 J. N. Liolios asked for information in regard to the Pierce engine. As I operated one of these a few years ago I can give the following information:—

The Pierce engine was built by the Pierce Engine Co., Racine, Wis. It was built purely for motorboats and I found it a very satisfactory machine in its class, that of an engine turning about 400-600 r.p.m. So far as I know it is no longer manufactured, at least by the Pierce Company. If your correspondent would write the Truscott Boat Co.,

also of Racine, they might be able to tell where parts can be secured as they used many of the motors in their boats.

If Mr. Liolios has any questions about the engine I would be glad to answer them if he will write me at 630 W. 147th street, New York City. I am a motorboat fiend and it was just by chance that I saw the query.

New York City. W. G. RANDOLPH.

Thinks Mystery Motor Is Racine-Made

Editor THE AUTOMOBILE:—I think, from J. N. Liolios' description in the Rostrum for February 18, that this Pierce single cylinder gasoline engine was manufactured by the Pierce Gasoline Engine Co., which was in business, I think, in Racine, Wis., 20 years ago. The engine was cranked over compression by rocking the flywheel. The writer and his partner, E. I. Boies, had one of these Pierce gasoline engines in use in their printing office at Sycamore, Ill., 20 years ago. It was a good engine, too.

Rock Island, Ill. F. O. VANGALDER.

Wants Dual Ignition Explained

Editor THE AUTOMOBILE:—Will you kindly explain in your next issue of THE AUTOMOBILE the dual ignition system?

2—What is the advantage of it in racing cars?

Bangor, Me. CHAS. V. JASQUITH.

—Dual ignition, as has frequently been explained in these columns, is hat system of ignition in which there are two sources of ignition current with a single distributor and a single set of spark plugs. Its purpose is to provide an easy current for starting and a steady current for running. To meet these conditions we often find that one branch of the dual system comprises a battery with a vibrator coil and the other branch a high-tension magneto. For starting, the vibrator coil is efficient at the low speeds of hand cranking. For continued running the high-tension magneto supplies a steady current without exhausting a definite supply and without material drain on the power of the motor.

2—Evidently from this question you are under the belief that dual ignition furnishes two sparks at the same time in the combustion chamber. This is not true. The ignition which supplies two sparks at once is a synchronized two-point or two-double ignition. The advantage claimed for it is quick ignition of the charge.

Overhauled Mitchell 1912 Six

Editor THE AUTOMOBILE:—Am submitting the following details of a job which I recently did and would like you to give your opinion of same:

Recently I had a 1912 Mitchell six runabout to be overhauled and in order to make the car as nearly perfect as possible, I made the following changes: On dismantling the motor I found the piston assembly varying as much as 7 ounces out of balance and the cylinders (3 3-4 bore and 5-inch stroke) having a .004 to .005 inch wear in the head and .002 to .004 out of round. I sent the cylinders to the Houpert Machine Co., N. Y. C. to be rebored and ground. Instead of five 5-16-inch rings I had same made with three 1-4 rings. The piston was machined from 1-4-inch above the wristpin to 1-4 below 1-16 of an inch in depth so rings would have no wearing surface on cylinder. Oil holes were drilled so no oil pocket would form.

I also ordered the following piston clearance: .0035 clearance at base of piston and .008 at the head. Cylinders were bored straight, wristpins were locked by set screw instead of piston ring.

The flywheel weight was reduced from 72 to 50 pounds by removing metal from top of rim and perfectly balanced. The pistons were made a little too heavy as same were only 4 ounces lighter than those of the former. By reducing the number of rings from five to two and 1-16 less diameter do you not think it will make much less piston friction and by perfectly balancing pistons and connecting-rods and flywheels, don't you think same will materially increase the speed of the motor? Have lengthened piston assembly 3 ounces and balanced same so there is absolutely no difference between any one of the four assemblies on a druggist's scale, which shows 1-16-ounce.

2—What valve timing would you advise for this motor for speed and power results?

3—What timing would you advise on a 1914 Trumbu 2 7-8 by 4?

Manchester, N. H. DANA L. REED.

—The steps which you have taken in this work seem to be correct. The use of the fewer rings cuts down the bearing surface of the rings from 25-16 of an inch to 12-16 thus giving less than half the frictional surface. If these rings will hold compression, this condition will be desirable as the object is no doubt to secure the best possible compression with the least possible bearing surface. By decreasing the unbalanced forces the speed at which you may run the motor will be materially increased.

2—A good timing for this motor is that used in the Continental sixes having dimensions nearly similar and designed to run at high speeds. In these the inlet opens at 10 degrees past top center and closes 28 degrees past bottom center. The exhaust opens 40 degrees before bottom center and closes 2 degrees and 30 minutes after top center.

3—The timing of the 1914 Trumbull is as follows:—Inlet opens 10 degrees past top dead center, inlet closes 24 degrees past bottom center, exhaust opens 45 degrees before bottom center and closes 5 degrees after top center.

Liquid Carbon Removers Harmless

Editor THE AUTOMOBILE:—1—I drive a Stevens-Duryea model AA car. They recommend for the transmission case and rear axle gears a heavy black cylinder oil which must be free from acids so as not to injure the annular ball bearings, an oil known as 600-W is mentioned. Will you please tell me whether I should use Mobiloil C or Mobiloil D for this purpose or can I buy the so-called 600-W? Mobiloil D is said to take the place of 600-W but is for steam cars while Mobiloil C is a dark oil for transmissions.

2—What can you tell me regarding the so-called liquid carbon removers, which are put in a cylinder and left in over night, then withdrawn with an oil gun. Will it remove carbon and will it injure the motor?

Detroit, Mich. D. R. MARTIN.

—The C grade of Mobiloil should take care of the lubrication of your gearset.

2—The liquid carbon removers are as a rule quite efficacious. The point to be guarded against in the use of these is that they very often cut away the lubricating oil, rendering it necessary for a slight amount of lubricant to be injected into the cylinder before running the car. If this is done there is hardly any fear that any of the well-known solutions will damage the motor.

New Pins for E. M. F. Piston

Editor THE AUTOMOBILE:—Kindly tell me the way of adjusting the wristpins in a 1910 model E.M.F. Is it necessary to fit new pins or bushings?

Marquette, Mich. A. A. YOUNG.

—Unless the wear is quite bad it will not be necessary for you to fit new bushings but merely to put in an oversized pin. These you can secure from the factory for 60 cents apiece. They are made from .003 to .004-inch oversize especially to take up the wear of the bushings. Should you find it necessary to renew the bushings, there are two of

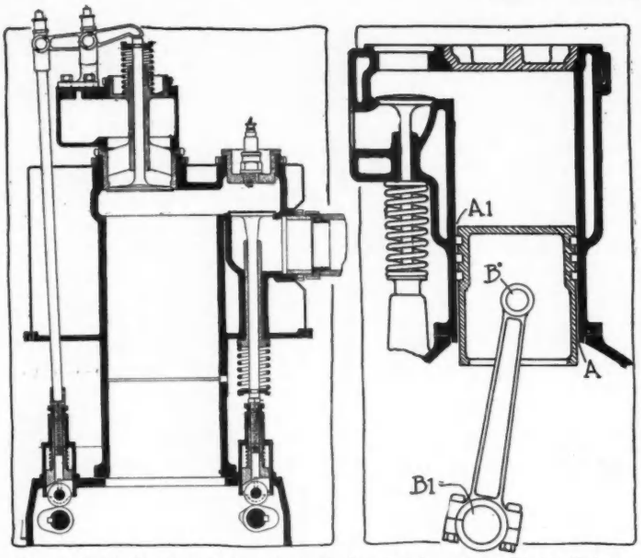


Fig. 1—Left, Sectional view through Chadwick motor. Right, Points of wear on a piston

these in each connecting-rod and they cost 50 cents apiece. The difficulty with these is in the reaming, which is necessary in order to get them to fit.

Chadwick Has 3-Inch Valve

Editor THE AUTOMOBILE:—Will you kindly publish in the Rostrum a diagram of the Chadwick cylinder construction, showing how the copper jacket is applied, spark plug location, and the method of attaching inlet, exhaust and water piping.

2—What is the diameter of the valves used in these motors?

3—What is the maximum speed in revolutions per minute?

4—What is the maximum speed of the Chadwick runabout with a 2 to 1 gear ratio?

Haverhill, Mass. FRED B. HORSCH.

—Referring to Fig. 1, a sectional view of the Chadwick motor will be noted. This illustrates the method of applying the copper water jacket, the location of the spark plugs, and the method of attaching the manifolds.

2—If the Chadwick motor referred to is one built within the last 3 years, the inlet valves are 3 inches in diameter and the exhaust 2.125.

3—While the engine will run at a maximum speed of 2,500 r.p.m. the best pulling speed is between 1,600 and 1,800 r.p.m.

4—According to the Chadwick Engineering Works, the manufacturers of the Chadwick car, at 1,600 r.p.m. with a gear ratio of 2 to 1, the car will have a speed of 80 miles per hour. By gearing the car a trifle lower, say 2.125, or 2.25 to 1 it may be a trifle faster as this would allow the engine to develop its maximum horsepower.

Viscosity Bears Relation to Clearance

Editor THE AUTOMOBILE:—I am writing this manuscript in an effort to correct one of the commonest and worst errors made in making repairs on gasoline motors. It has been my experience and observation that not one out of a hundred of our very best garage mechanics have a clear idea of the proper ratio of wear to the viscosity of lubricants.

Suppose you or I take a car to the best repair shop in town to be overhauled. The machinist in charge will tighten the frame, tighten the motor on the frame, properly grind the valves, adjust the valve mechanism so that it is again practically noiseless and a hundred and one other things, but when he comes to the motor, he gives the connecting-rod bearings and the crankshaft bearings the same adjustment that they had when the car was new.

Now then, referring to the drawing, in a car that has been used some time, there is bound to be a certain amount of wear A and A1 at the right, Fig. 1, and between the piston rings and their grooves; if the repairman gives the bearings B and B1 and the main crankshaft bearings—not illustrated— a tight fit, a thin lubricating oil is necessary in order to lubricate them, and this thin oil will work past the pistons into the cylinder hears, forming carbon deposits and excessive smoking.

If a thick enough oil is used to make good compression and prevent leakage, the bearings will not be lubricated and they will either burn out or cause a seized crankshaft.

By adjusting the aforementioned in proportion to the wear in the cylinders and then using a thick enough oil, an old motor can be made to work perfectly again.

Of course, if the wear in the cylinders has progressed to such an extent that even thick oil works out, new pistons should be made, the bearings readjusted and a thin oil used as when the car was new. Just a little study and application and perhaps some experimenting along the lines of this article should mean a much more quiet and powerful motor after being overhauled.

Knoxville, Tenn. D. C. GOFF.

S. A. E. Ratings of Sixes and Eight

Editor THE AUTOMOBILE:—1—What is the S. A. E. horsepower of a six-cylinder motor with 2 7-8-inch bore and 4 1-2 inch stroke?

2—What is the S. A. E. horsepower of a six-cylinder motor with 2 7-8-inch bore and 4 1-2 inch stroke?

3—What is the S. A. E. horsepower of an eight-cylinder motor with a 3-inch bore and 4 1-2-inch stroke?

Carver, Minn. EDWIN HURTIG.

—Horsepower equals 20.00.

2—20.00.

3—28.80.

You will not doubt think it extraordinary that the motor with a 4 1-4-inch stroke and that with a 4 1-2-inch stroke will have the same horsepower by the S. A. E. rating. That this is true is due to the fact that the formula is based on the hypothetical piston speed of 1,000 feet per minute.

Buick Quit Racing in 1910

Editor THE AUTOMOBILE:—Please give a complete summary of the track, club and association rules under which the Decoration Day races are run at Indianapolis?

2—What are the qualifications expected of drivers?

3—What is the difference between what is known as brake horsepower and the S. A. E. rating?

4—How long has it been since Buick stopped racing?

5—Please explain the dynamometer test for gas engines?

Kansas City, Mo. W. C. BROWNS.

—It will be impossible in this space to give the entire rules governing long distance track races. A copy of these may be had from the American Automobile Assn. Contest Board, 437 Fifth avenue, New York City. In addition to these rules the following are generally adopted by the Indianapolis Motor Speedway Co.

A—The cars may show 75 miles per hour for one full lap of 2.5 miles to qualify.

B—All steering knuckles, front axles, frame hangers and steering mechanisms must be approved by the Indianapolis Motor Speedway mechanical engineer before they are allowed to start.

2—Drivers must be registered by the A. A. A. before they are allowed to compete and must be at least 21 years of age. The referee passes upon the fitness of the driver for the contest.

3—Brake horsepower is that measured on an instrument to determine the actual output of a motor. The horsepower by

the S. A. E. rating is that calculated by the formula $\frac{D^2N}{2.5}$ where D equals the bore in inches and N is the number of cylinders.

4—As a company, Buick withdrew from racing in the fall of 1910 at which time the paid racing team of this company was disbanded.

5—The dynamometer test for gas engines consists of mounting the motor upon a testing stand in connection with some form of dynamometer. The motor is then run under its own power driving this dynamometer. In connection with the dynamometer, there is a measuring device which enables the engineer to register the horsepower at the r.p.m. at which the motor is operating. This is obtained throughout the entire range of speed and the results generally plotted in a curve of horsepowers.

Comparative Weight of Cantilever

Editor THE AUTOMOBILE:—I wish to use No. 3 gauge steel in a pair of half-elliptic rear springs.

Weight of loaded car is 1,000 pounds on each spring. I desire a depression of 5 inches under this load and to allow for a further surge of 5 inches, when the fiber stress shall be limited to about 100,000 pounds. Please give width, length and number of plates necessary in such a pair of springs.

In this estimate, please ignore variation of capacity on account of the rise of the spring, and, therefore, in giving the length of the spring, use developed length of main plate from center to center of eyes; springs should be as light as possible.

Please give approximate weight of these springs, ignoring weight of eyes, cutting the long plate 2 inches back of center of each eye, and cut the short plate 12 inches long.

Also for a pair of cantilever springs, use same weight of car, same depression, surge, and fiber stress, and give the necessary dimensions, including gauge of steel. Lay out and estimate the weight in the same manner as above. Cantilevers to be in center. These are also to be as light as possible.

A clear and concise reply in your next issue will greatly oblige.

What I want to find out is the comparative weights of these two styles of springs under the same conditions.

Incidentally, I could hardly understand your article on this subject last May.

New York City. CONSTANT READER.

Cannot Locate Elusive Knock

Editor THE AUTOMOBILE:—Will you kindly inform me what you think would be the cause of a knock? I have been unable to find the cause, although I have tried first by removing the carbon, also looking for loose main, connecting-rod and wristpin bearings. I have taken the engine apart three times and carefully inspected the parts. I tightened up all the parts mentioned, thinking that the knock would cease, but I find that it is still there. Probably it is in the ignition. I would like to have you explain what you can about a knock caused by ignition and if it is possible, mention other causes for such trouble. I could then decide more easily what would be the best thing to do.

Marlboro, Mass. H. E. MOINEAU.

—Carbon behind the piston rings, causing them to stick and thus allowing oil to get into the cylinders and carbonize, very often is the basic reason for these knocks, but from your letter it would seem that you had thoroughly cleaned all the parts. It is possible to have a knock from ignition by having the spark timed too early. The full retard position of the magneto should allow the spark to occur on upper dead center. If the motor is revolving slowly, it will knock should the spark occur at this point on account of the tendency of the explosion to act against the inertia of the upwardly moving parts.

Another cause which you have not mentioned is piston slap. A loose piston will give a knock that is very difficult to locate.

Another part that sometimes is loose and causes knocks is in the fly-wheel connection. Timing gears are also capable of giving distinct knocks and if you have not examined these, would advice you to go over them carefully.

The Fit of Piston in Cylinder

Editor THE AUTOMOBILE:—Please advise me how many thousandths smaller the piston should be than the cylinder, considering ground surfaces?

I have a cylinder grinding machine and I am about to refit old cylinders with new pistons. If the clearance varies in different cars, please advise what is the best in each case of the different cars that you know of, especially the Ford.

Prattsburgh, N. Y. H. C. MORGAN.

—The clearance between the piston and the cylinder varies for the uses to which the motor is to be put. It is also different at the top of the piston from what it is at the bottom, as a rule tapering from the top to the wristpin, after which it is constant for the remainder of the cylinder. The clearance in an average piston would be somewhere in the neighborhood of .005-inch at the wristpin and .006 or .007-inch at the top. In the Ford car the clearance is .0035 at the top and .002-inch at the wristpin.

Garage for Two Cars and Driver

Editor THE AUTOMOBILE:—Would greatly appreciate any suggestions that would assist me in planning a garage I find necessary to build. The building should be large enough to accommodate two cars and provide sleeping room for the driver. It should also be in keeping with my suburban home, which is a frame shingle-roof-and-sides cottage style.

Steubenville, O. I. M. S.

The simplest and most economical garage for you to build, would be according to that shown in the accompanying drawing, Fig. 2. This gives you room to put the two cars in position side by side and also to accommodate the driver in the space above. The dimensions could be slightly altered to take care of the two cars you wish to accommodate. With this arrangement the driver should have a protection about the entrance to the stairway from above. The one objection to this type of garage is that if it is in the sun the heat in the upper compartment becomes very objectionable. Therefore if the building can be placed under trees where the sun does not beat directly down upon the roof it had better be done. To put the driver's room upon the same floor as the cars would be to give a straggling appearance to the garage which would perhaps mar the layout of your grounds.

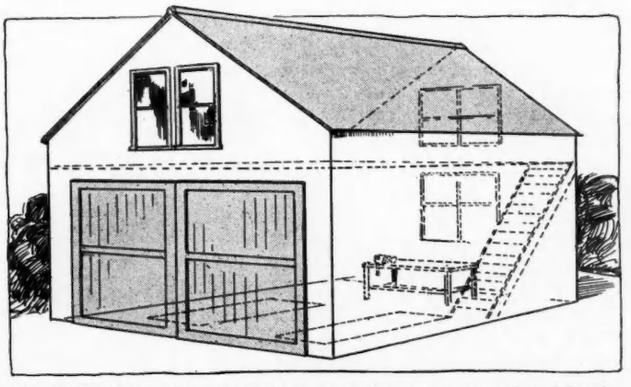
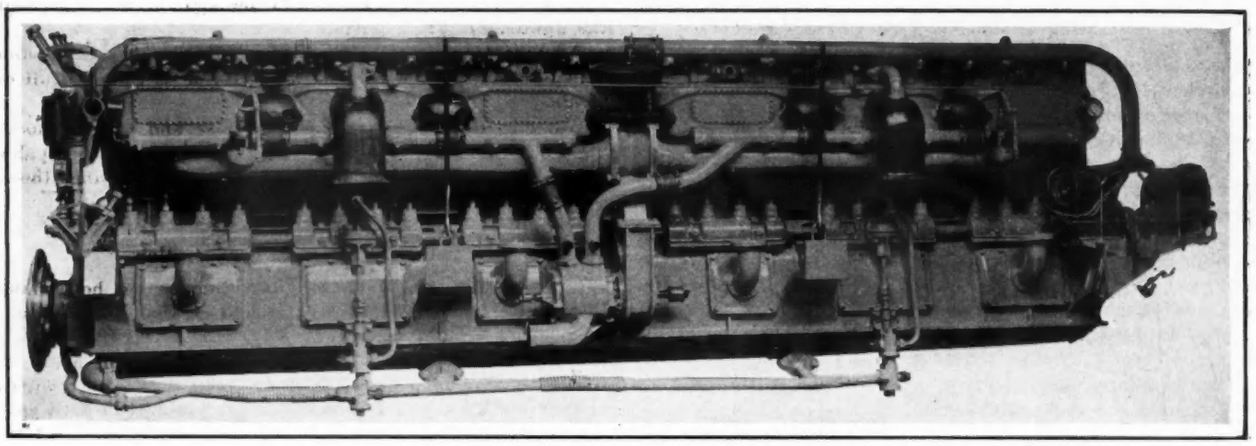


Fig. 2—Skeleton view of simple garage for two cars and a driver's sleeping apartment



A twelve-cylinder tandem motor built for a boat by the Wolseley Motor Co., of England

History of the Twelve-Cylinder Motor

Early Types Built for Motor Boat Work, Though Aeroplane and Automobile Designs Appeared Later

By Eric W. Walford

MOTOR boat racing was responsible for the introduction of the twelve-cylinder gasoline motor, and, curiously enough, two widely different types appeared at the same time, being fitted to the two highest powered motor boats taking part in the Monaco meeting of 1910,—the Ursula and Maple Leaf II.

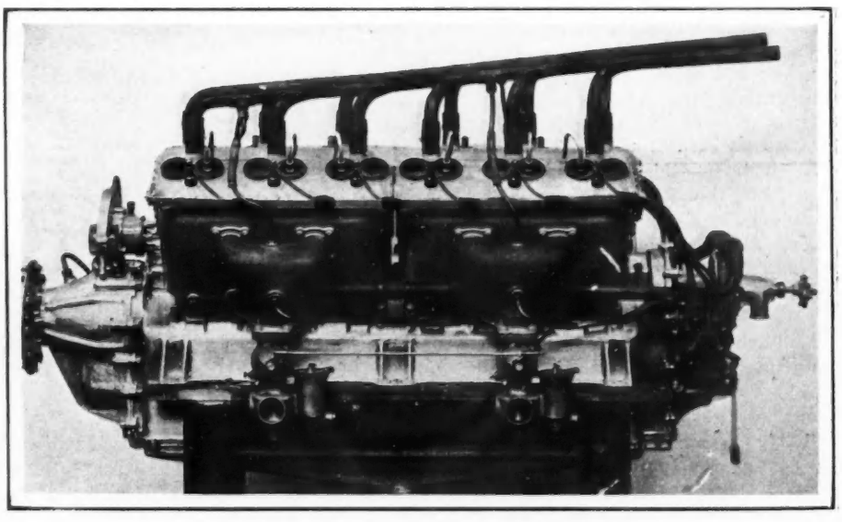
The former was provided with two twelve-cylinder engines made by the Wolseley Motor Co., England, and, it will be seen from the picture, that the cylinders were all in line. There were two propellers, each being driven by a separate twelve-cylinder engine of 7 1-4 by 7 1-2-inch bore and stroke. To all intents and purposes each set consisted of a pair of six-cylinders coupled together and placed in line, each unit being provided with a six-cylinder magneto. There was a single carbureter supplying one long induction manifold with branches leading to the cylinders, and all the exhaust discharged into a single central expansion chamber. Added to these were two longitudinally arranged water pipes and various oil pipes; so accessibility was not a strong feature of the motor which was built solely for power, and did very well.

The engines of the Maple Leaf were a considerable novelty, in that they were of the V-type with two rows of six cylinders mounted upon a common base chamber in a fashion which has now become more general. These engines were made by the Orleans Motor Co. and had a peculiar history, as they were first placed in a 50-foot racing boat, and a cracked cylinder caused withdrawal from the Monaco meeting. They were repaired and then set up in a new hull which entered for the British International Motor Boat trophy competed for in Huntington Bay, U. S. A. This time the *boat* failed, so the engines were taken out and rebuilt in a new boat.

After many vicissitudes it was decided to build another boat, Maple Leaf IV, and the engines were then sent to the Austin Motor Co., England, for reconstruction.

The illustration at the top of page 501 shows the engine as rebuilt. With a bore and stroke of 7 by 7 1-2 inches nearly 400 b.h.p. was developed, and the running was so satisfactory and reliable that the boat took the B. I. trophy back to England.

The chief constructional features of this engine will be recognized from the illustrations and it will be noticed that the induction pipe was of the continuous, or circulating, type



The Sunbeam twelve-cylinder aeroplane engine

there being in fact, two pipes connected together by a bend at each end, and each bend communicated with a White and Poppe carbureter. The inlet valves were arranged over the exhausts and the latter discharged into a water-cooled expansion chamber carried over the cylinder heads. Each line of cylinders was provided with its own magneto, but a single camshaft was used for the operation of all valves.

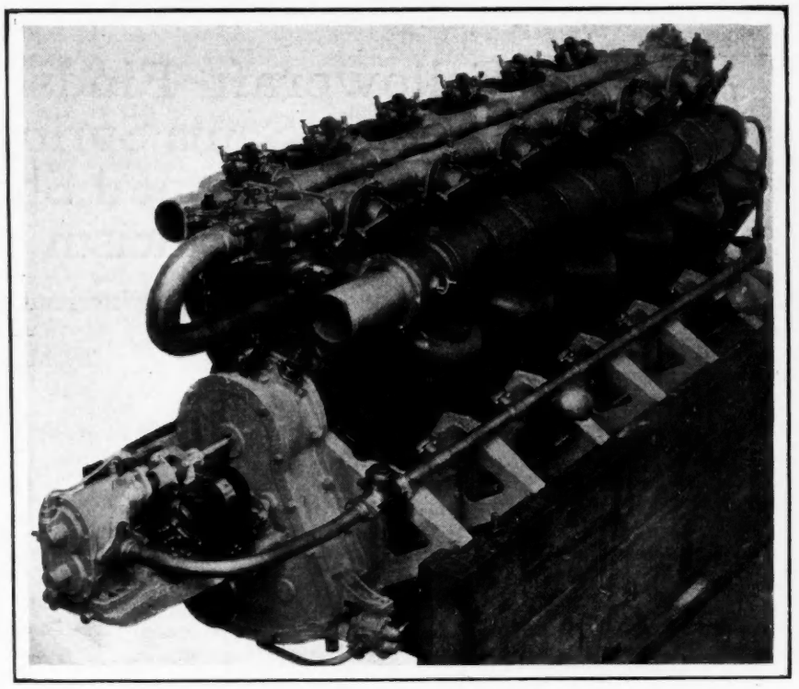
Sunbeam Racing Car

Coming down to more recent times we arrive at the Sunbeam racing car engine, which is well known throughout the motor racing world. In this motor the cylinders were cast in sets of three with a single camshaft and water pump, and a 60-degree angle was used for the V so as to keep down the width. A twelve-cylinder V-type engine with the cylinder lines at 60 degrees is very good as regards uniformity of torque and balance and it is therefore a luxurious engine. It is also light for its power, owing to the fact that it employs a single crankshaft, camshaft, etc. Therefore when high power and light weight is required it is not surprising to find that this type of engine is becoming more and more widely used. Based upon its experience with its twelve-cylinder racing car engine the English Sunbeam Co. has for some time been making twelve-cylinder aero engines, of which one is shown in the illustration at the bottom of page 500.

On the car engine there was one carbureter for each line of cylinders and the two carbureters were arranged at the rear ends of the cylinder lines, while the induction manifolds were located on the outer sides of the cylinders. In the aero engines the induction pipes are in the same position but each cylinder block is provided with a carbureter, making four carbureters in all.

Manifold Arrangement

The arrangement of the various pipes and manifolds is a matter of great trouble to the designer of a twelve-cylinder motor, but on an aerial engine there is some latitude and the Sunbeam scheme of arranging the carbureters at the sides of the engine is good on the score of accessibility, since between the cylinder lines there are merely the exhaust manifolds; though of course, in an aeroplane engine nothing much in the way of an exhaust pipe is necessary. Contrast this with the Maple Leaf engine and one will understand readily that valve accessibility is not a strong feature of this type of engine if a single camshaft is used. So far as I am aware no twelve-cylinder engines have been made with two camshafts, one on each side; though the Rolls Royce Co. made an eight-cylinder engine on these lines many years ago. Even with the all-in-line type of engine illustrated at the top of page 500, there is considerable congestion of piping. The carbureter was located in the center of the engine and communicated with by means of a branch passing between cylinders numbers six and seven with the inlet manifold. The exhaust manifold is not shown but two exhaust branches are visible. When the exhaust manifold is in place the valves are practically inaccessible. It is well known that a single straight inlet or exhaust pipe does not give the best results in a six-cylinder engine, and consequently simplification of the piping system does not seem practicable. If a V-type six-cylinder engine were fitted with slide valves most of these objections would be overcome. Then the piping could all be arranged between the cylinder lines, making a very neat engine.



Austin motor built for Maple Leaf IV, the Canadian racing boat

As stated, most of the twelve-cylinder engines so far produced in Great Britain have been for motor boat and aerial work, where accessibility is not of extreme importance as these engines are usually attended to by a staff of mechanics, the conditions for automobile work being different.

—

Family Head Responsible for Accidents

DENVER, COL., March 12—A verdict holding the head of a family responsible for an accident caused by an automobile owned by the wife or other member of the family has just been rendered by a jury in Judge C. C. Butler's division of the Denver district court. The jury also awarded the plaintiff $3,750 damages for injury, which is said to be the largest amount ever allowed in Denver in an automobile accident case. The suit was brought against Mr. and Mrs. Ben Kemper by J. A. McIntyre for injuries caused by Mrs. Kempers' electric car, which she was driving at the time of the accident and which she also personally owns. Mr. Kemper's defense against responsibility was based on the ground that his only connection with the accident or with the ownership of the car itself was through having bought the car and given it to his wife as a present.

Mr. Kemper's lawyers have filed a motion for a new trial, and if this is denied they threaten to carry the case to the state supreme court.

The developments of the case are being watched with interest by representatives of companies writing liability insurance for automobile accidents.

—

Killing by Reckless Driving Is Manslaughter

DES MOINES, IA., March 12—The state supreme court of Iowa made a decision of far-reaching importance to automobilists last month in which it laid down the rule that automobile drivers who kill persons in the highway by reckless driving may be convicted of manslaughter.

The decision came in the case of G. W. Biewen, of Keokuk county, a farmer, who was convicted for the killing of Clarissa Hammes, a child 18 months old, in the road between Harper and Richland on August 16, 1913. He was sentenced to a term of not to exceed eight years in the penitentiary and on appeal the supreme court affirms the decision of the lower court.

The case is the first in Iowa in which a driver has been sentenced for manslaughter while using an automobile as a "dangerous weapon." The record shows that Biewen went on and did not offer to aid the injured child. The mother of the baby witnessed the accident.

Discussion of "The Improvement of Spring Systems"

First Definite Conclusion of Series Draws Qualified Support.

Fellowcraft Finds Figures To Justify Using Same Springs for Vertical and Horizontal Shocks—Helpful Criticism Answered

A Question of the Elastic Limit of Springs in Practice

By M. C. K.

FEW combine the training, the interest and the vitality of intellect which would enable a single individual to formulate and present final conclusions on a complicated subject quite correctly at first trial. Until the foundations of a chain of reasoning have been well worked over everybody overlooks one thing or another. The automobile is the best modern example of a complexity in requirements which baffles single-handed solutions in both theory and practice, while its problems cannot await the completion of life studies or slow academic evolution. Some of the simple formulas of kinetics agitated master minds, among them Newton, Leibnitz and Descartes, for more ehan 200 years before they were crystallized and became common property, with erroneous views eliminated.

Public Scrutiny of Figures Helpful

In the transition from slow-speed motors to high-speed motors the consequences and changes, with regard to engine balance, lubrication, valve-timing, bearing-dimensions, etc., which were unavoidable and might have been foreseen by a super-intellect, were not, as a matter of fact, realized in advance by any single individual. Co-operative analysis and figuring were necessary. The academic prejudice to the effect that figures MUST BE final, correct and conclusive when first publicly presented hinders perhaps constructive industrial progress more than any other factor. But it is giving way to a less cramped view of the functions and value of publicity. In every design-problem which arises figures must now battle against other figures until those that are both right and important stand clear and proved. So long as only indefinite words are used, erroneous statements pass muster with facility, unchallenged but also ineffectual. The indefinite cannot be disputed or corrected. It does not dictate new design; it does not help. In accordance with this view the current series of articles on Improvement of Spring Systems, which does not represent an impossible life study but a practicable amount of incidental work, is not a treatise but an inquiry in figures, the figures being intended to make the expression of ideas definite and useful by making them subject to criticism. The method has realized its object at once, for no sooner was the first definite conclusion advanced relating to the need of cushioning the horizontal components of road shocks, before engineers actively engaged in the industry attacked the reasoning on the basis of the figures and thus caused the subject of spring suspension to be entered among those discussed in definite terms; and these lead by the shortest possible route to definite demands in design and construction.

Fair Criticism

The communication from A. Fellowcraft which follows will be found very interesting. It is a rational onslaught on the writer's figures. A division under sub-heads has been inserted and it is especially the last portion under the heading "A Constructive Contribution" which is thoroughly appreciated, as it is believed that the proposed method for determining the horizontal component is essentially more correct than the writer's and sweeps aside some cobwebs relating to the possible influence of the wheel rotation with which the writer's presentation was encumbered. However, another element seems to have been underrated by Fellowcraft at this point, as explained in the attached comment, and, on the whole, the writer's practical conclusions seem strengthened rather than shaken by the criticism. The required revision of figures may change them very little.

Letter from Fellow Craftsman

My dear M. C. K.

The writer has followed your series of articles on Improvement of Spring Systems with considerable interest and is heartily in accord with your first definite conclusion, that provision should be made for an elastic resistance to the horizontal component of the road shock.

A little later, however, you show by concrete figures that a "combination" spring is not possible, or as Mr. Ego in his letter of Feb. 25 puts it,

"You cannot cushion 8524 foot pounds of horizontal stress in a 1 to 2 inch movement of the same spring combination from which you expect to use a 4 to 5 inch movement for cushioning 3180 foot pounds of vertical stress."

Such a condition would certainly preclude the efficient use of a "combination" spring if the ratio of horizontal to vertical stress as given is correct.

It therefore seems necessary, out of a sense of fairness to our old friend the combination spring, to point out a mathematical error at the very beginning of the reasoning, and likewise, as it would appear to the writer, an error in the mechanics of the subject.

Challenged Figures

In series III you say relative to Fig. 6: "It is not necessary to find α in degrees, as it is known that $20'' \sin \alpha = 17''$ and $20'' \cos \alpha = 10.53''$ and the same proportion holds good for any other radius than 20". Dividing in this proportion, one has BA $= 117{,}187 \times 10.53 : 27.53 = 44{,}650$ footpounds, and the mean between this and zero is 22325 footpounds."

The energy represented by BA is clearly K. E. $\cos \alpha$ or $117187 \times 10.53 : 20$ since $\cos \alpha = \frac{10.53}{20}$ as you *show* above and not $\frac{10.53}{27.53}$ as you *use* in all the computations.

Likewise $\sin \alpha = 17 : 20$ instead of $17 : 27.53$ as you have invariably used.

These mathematical errors are sufficient in themselves to render the final shock figures valueless unless corrected, but it appears to the writer that an error in the reasoning has been introduced that is farther reaching in its effect on the final results than the mathematical ones.

You say, still relative to Fig. 6, "To simplify the estimates, the center of gravity is supposed to lie in the line NB, and while horizontal shocks can be resisted *at B* by the energy of the whole vehicle and a mass determined by 3000 pounds of material, the vertical shocks can be delivered only against 1000 pounds."

This statement is absolutely true if the condition given is rigidly adhered to. That is, if the horizontal force be applied *at B*, in the plane NB.

Values of the Components

The resisting force *is* applied in the direction AB making an angle α with the plane of NB. Its vertical component has a value AB sin α and its horizontal component a value of AB cos α is that proportion of AB that is applied in the plane NB and is therefore capable of resisting horizontal kinetic energy.

NOW FROM THE VERY DEFINITION OF THE COMPONENTS OF A FORCE, THEIR GEOMETRIC SUM MUST *EQUAL* THAT FORCE. AND THE COMPONENTS OF AB MUST BEAR A *FIXED* MATHEMATICAL RELATION TO EACH OTHER, THAT IS A FUNCTION OF THE ANGLE α.

You have shown that with a vertical reaction of 1000 pounds upon the front axle, 3180 footpounds of energy were necessary to impart to that 1000 pounds of material a vertical velocity of 14.25 ft. per sec., that being the velocity acquired in raising it 3″ in height, over a lineal distance of 10.53″, at a lineal speed of 50 feet per sec.

3180 footpounds is therefore the *maximum* resistance possible in a vertical plane. It is therefore the maximum possible value of the vertical component of AB.

The maximum possible value of AB is therefore $\frac{3180}{\sin \alpha} =$ 3180 × 20 : 17 = 3740 footpounds.

The maximum possible value of the horizontal component of AB is AB cos α = 3740 × 10.53 : 20 = 1975 footpounds.

For the given angle α then, the ratio of the horizontal to vertical shock stresses is in the proportion 1875 : 3180.

Since the vertical component of AB varies with the sine of α and the horizontal component with the cosine, it is evident that for all values of α greater than 45° the sine or vertical component will predominate making the ratio of the horizontal to the vertical stress less than unity, and this condition will probably prevail for 95% of the obstacles encountered.

In a spring suspended vehicle, there is another condition demanding consideration. Your chosen condition is that of a perfectly level roadway previous to the encountering of the obstacle A.

In practice this is rarely the case and the value of the vertical reaction or the vertical load upon the axle B is largely affected by what has just previously occurred. The instantaneous value of the normal weight of 1000 pounds may be much greater or much less, depending upon the instantaneous perpendicular direction of motion and velocity of the platform mass supported at B, that is, it depends upon the inertia of the mass of the platform supported at B.

A Constructive Contribution

If this inertia or resistance to acceleration during the time the obstacle is being surmounted be represented by a mean value R, the horizontal component—H—of the shock force may be expressed by the equation H = R cotan α. Apparently, the horizontal component of the shock force is not a function of α alone as you show from the reasoning relative to Fig. 6, but is a combined function of α and the vertical reaction of the axle receiving the shock.

Doesn't it seem reasonable that this statement is correct, when one considers different loading conditions of the platform. From the equation that the horizontal component H = R cotan α it is evident that the greater the proportion of the load carried by the front axle, the greater the value of R and therefore of H, while a zero value of R makes horizontal shock impossible.

It would therefore appear to the writer that a construction as you suggest in Fig. 21 in which the axle yields obliquely to the shock force might work out very well in practice, particularly on a vehicle using pneumatic tires, and that similar constructions using the condemned "combination" spring may through their simplicity give better *general* results than the more complicated "separate element" construction.

Let me say in conclusion that if there be any doubt as to the correctness of the mechanics of the above solution, try synthetically, to construct a force triangle with the two sides having the values of 8524 and 4450 respectively (your Fig. 6) and obtain a resultant in the direction AB.

Yours for a clearer understanding of the art.

March 10, 1915. A. FELLOWCRAFT.

Answer to Criticism

The reason for using the values 10.53 : 27.53 and 17 : 27.53 instead of using 20 as the divisor in both cases, and doing this throughout after having shown that the ordinary value of the components is that obtained by dividing by 20, is simply that the figures relate to work values and not to pressures. It would be easy to arrange perpetual motion if the two components of a work value $ks = mv^2/2$, amounted to more than ks. This probably only requires to be mentioned to show that in the figures actually used the s-values, which do not occur in the parallelogram of pure forces, have simply been restored. A comparison of the work and the pressures applied to a toggle joint will illustrate the correctness of the figures used. This was originally very briefly referred to.

The alleged error in reasoning which Fellowcraft thinks more serious seems to be partly the same error, which is not

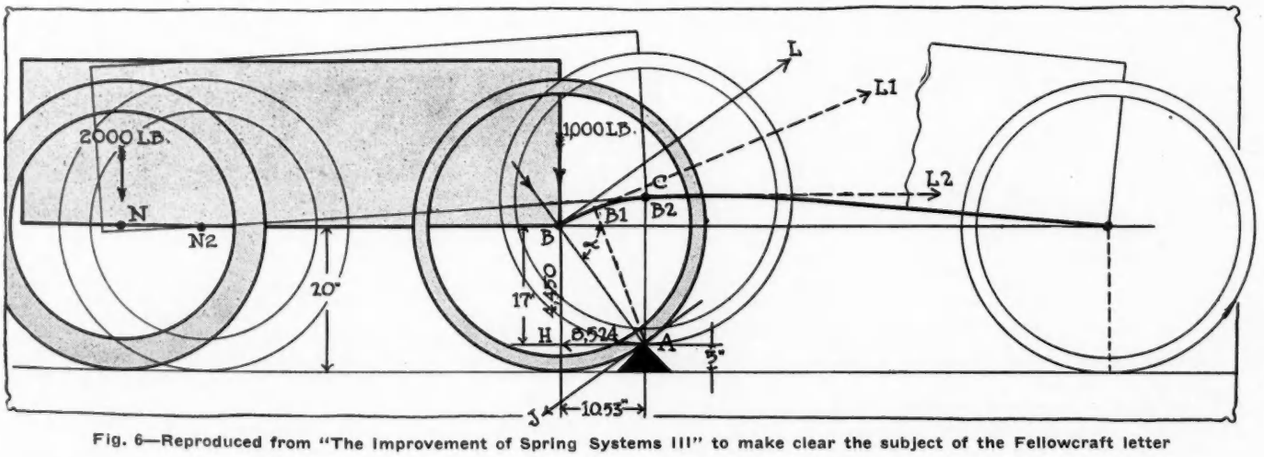


Fig. 6—Reproduced from "The Improvement of Spring Systems III" to make clear the subject of the Fellowcraft letter

an error, and partly another matter. The geometric sum of the components should equal the original force. True for force but not for work. Here the plain sum of the components, not their squares, should equal the original work or kinetic energy; none is lost. BA plus BL represent the whole energy. But when it comes to figuring the vertical and the horizontal components of BA the word "component" is evidently no longer used in the same strict sense, because only the speed and the 1,000-pound front-axle load determine the vertical component while the horizontal component is determined largely by the whole vehicle weight. They are therefore components of different forces, or work values. Their relations to one another are not a function of sin α, and one cannot be calculated from the other, as Fellowcraft does. Only by ignoring the weight of the vehicle as a whole does he obtain a low value for the horizontal component.

But when Fellowcraft urges the relation of the horizontal component to R cotan α—which under the supposition of a level road before the obstacle is reached means 1,000 pounds multiplied by cotan α—the writer is bound to admit that this element certainly should have been considered in figuring the horizontal component. The mere fact that when R = 0 the horizontal component also becomes 0 does of course not exclude the vehicle weight from consideration, but it does admit R as a factor. That the vehicle weight cannot be mathematically excluded is evident from any consideration of a case in which the value of sin α approaches zero.

The difficulty in formulating just how both factors enter arises probably from the complicated nature of the actual condition, the point of attack for the resistance moving in a curve from B to C during the impact, while the acting force —and therefore also the resistance which is its reaction—is complicated by the gravitation or inertia of 1,000 pounds. It was the intention of the writer to find a somewhat acceptable approximation to a correct value for the horizontal component, and now Fellowcraft has shown that in such an approximation some function of the 1,000-pound axle load should be included as a factor. But it seems also clear that a function of the 3,000 pounds of vehicle weight cannot be eliminated and that it will increase the value of the horizontal component considerably, as compared with that upon which Fellowcraft bases his belief in the practical sufficiency of a single or "combination" spring element for cushioning the whole shock.

Until a way is found for estimating the horizontal component with proper regard for both elements in the shock, the question of the preferable means for cushioning both of them may therefore remain in abeyance to a certain extent. Separate spring elements have it in their favor, however, that they permit the proper flexibility for the great majority of shocks, in which the horizontal component is negligible.

For the rear axle this should, in the writer's opinion, be decisive, whether the value of the horizontal component for sharp and dangerous shocks comes nearer to his or to Fellowcraft's estimate. Both valuations are, after all, only estimates and only for one out of a thousand possible conditions.

The force triangle suggested by Fellowcraft is not convincing when the components represent resistances to two different forces: one the gravitation of 1,000 pounds and the other the kinetic energy of 3,000 pounds.

It may be added that the objections relating to the figures 20 or 27.53 in the matter of—components of force *vs.* components of work—have also been made by another engineer.

Variations of the Elastic Limit

Another letter has been received as follows:

Editor THE AUTOMOBILE:—M. C. K. in his articles on "The Improvement of Spring Systems," near the bottom of page 280 in the February 11 issue of THE AUTOMOBILE, says:

"The retarding factors can reside in the metallurgical properties, which make the spring live or sluggish—and those which are sluggish generally take a permanent set sooner or later—in the friction between spring leaves or in friction in other parts of the vehicle which are subject to movement when the springs are working."

I would like very much to have M. C. K. explain this more in detail, especially in regard to whether or not he considers this action to reside in the metallurgical properties if the steel is worked within the elastic limit, also to what extent does he consider the modulus of elasticity of spring steel to vary?

American Steel Foundries — G. S. CHILES.
Chicago, February 26, 1915. — Mechanical Engineer.

By its definition the elastic limit of steel involves a complete return to the original position of a spring, but, as the writer understands it, not necessarily as prompt a return in one case as in another, though the length of the spring and other factors be alike. That is, the metallurgical properties (including those due to the presence of nitrogen compounds and oxides which can be removed by scavenger alloys or by electric smelting) which are found to change the elastic limit in course of time, probably impede the resilience at all times and steels exemplifying them probably have no perfectly stable elastic limit, although the shortcoming in returning to the original position is too small for measurement on any one occasion. The modulus of elasticity is determined by multiplying exceedingly small values ascertained by measurement by very high figures, and the unavoidable errors in this process cover, in the writer's opinion, a much wider margin than those variations to which any one piece of steel may be subject by reason of molecular changes, unless these are due to an annealing process or the hardening has been finished without relieving excessive or irregular tensions.

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Buick Experiment Station at Chattanooga

FLINT, MICH., March 12—The Buick Motor Co., has designated Chattanooga, Tenn., as the location of an experiment station for at least 6 months each year. All new models of automobiles to be manufactured by the company will be tested in Chattanooga fully a year before announcement of their completion, and before the factory at Flint, Mich., actually begins supplying them for the market.

General manager Nash and general sales manager Collins were in Chattanooga recently and approved the selection of that city as the site of operations for the head of the company's designing and mechanical staff. W. L. Marr, chief designer of the Buick cars, has purchased a $5,000 home on Signal Mountain near the Inn. He expects to reside there from 6 to 9 months each year. Mr. Marr already has two mechanical engineers employed under his direction executing paper designs for the Buicks of the future.

Operations of the experiment station will also be devoted to the testing of new inventions and improvements calculated to make a car faster, more durable and superior from every standpoint.

—

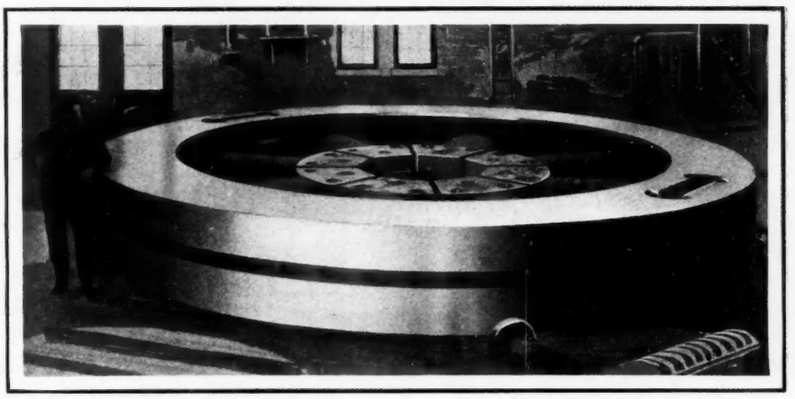
Cheaper Freight for Return Tanks

INDIANAPOLIS, IND., March 12—A hearing was held at Indianapolis recently on the complaint filed with the Interstate Commerce Commission by the Prest-O-Lite Co. against some twenty-five railroad companies in which more equitable freight rates on Prest-O-Lite empty tank shipments returned for refilling is sought. In less than carload lots coppered or plated empty tanks go as third class, whereas if they are painted they go as fourth class. In carload lots empty tanks, whether coppered, plated or painted, go under the same classification. The hearing was conducted by A. O. Bell, a special examiner for the commission. The company says a proper classification would result in a saving in freight charges of from $20,000 to $25,000 annually.

Huge Flywheel for Ford Plant

Casting and Machining Wheel Weighing 180 Times as Much as Ford Car Prove Difficult—Power House To Be Built Around Engine

FOR many months, the power plant buildings at the Ford plant in Detroit have been boarded up and one of the world's largest gas engines has been slowly nearing completion within: when all the heavy parts are in position, the building will be completed around them. The building and placing of the parts for the monster prime mover has made the engineers scratch their heads many a time, since the weight is such that new methods of moving them and special rigging to put them in position have been necessary, and have called for all the ingenuity of those in charge of the work.



Flywheel for big gas engine now being installed in the Ford plant

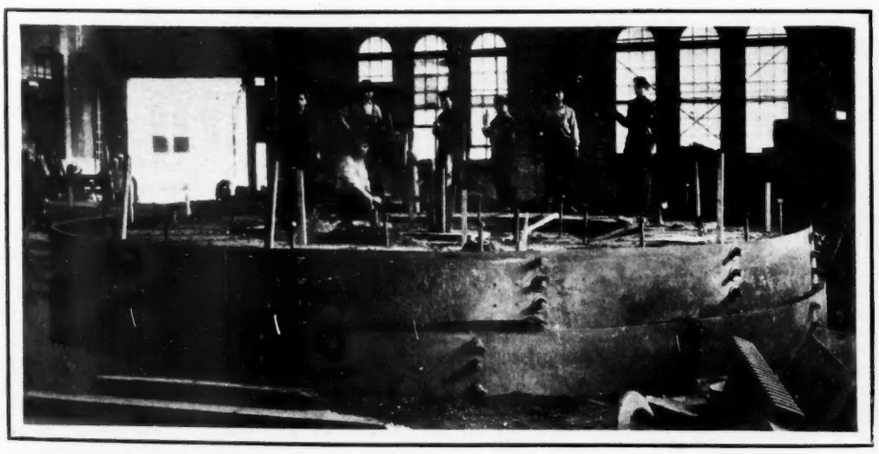
Perhaps the most difficult of the many problems was the building of the huge cast-iron flywheel which is a most essential part of the new engine. It was a big undertaking, for the wheel weighs 220,000 pounds and is 20 feet in diameter. Some idea of the enormous size is given by the fact that it would take more than 180 Ford cars, five average street cars or one good-sized locomotive to equal it in weight. Its diameter is two-thirds that of the average city lot, and it is more than double the height of the ordinary room.

Thus it will be seen that to cast and machine such a flywheel called for some interesting and novel tactics. It is the usual practice with heavy flywheels to make them in two halves and then to link these together when put in position. This wheel was made in two pieces, though it was cast as if it were all one, but instead of digging a pit in the floor of the foundry and pouring the molten metal into a mold made in that way, the Hooven, Owens, Rentschler Co., Hamilton, O., builder of the giant, decided to make up the form entirely above the ground and in the center of its casting floor.

One of the illustrations shows the mold in practically complete form ready to receive the metal. Curved plates of steel of comparatively short length were used and, for strength, were bolted together at the joints. These plates were short in order to insure the curve being a perfect one and, as they were not wide enough for use singly, two rings one above the other had to be made. Half a dozen men were employed to tamp down the molding sand into solid form and brick played an important part in the construction of the mold.

Then the next problem that confronted the maker was how to pour such an enormous quantity of metal so that the flow would be continuous, for once the pouring is begun, it must be continued without a break in the flow until the mold is full, or otherwise the casting will cool unevenly. It required a big melting capacity to heat enough metal all at once, and besides it is no small job to convey this from the point of melting to the mold.

Three overhead traveling cranes were pressed into service, and it was arranged for each crane to handle two huge ladles from which the liquid metal was poured into the mold. Having solved the method of transporting the metal, the next step was to arrange a time schedule for filling and pouring from the ladles. The force of employees was carefully instructed as to the system and everything moved with military precision, each ladle being given a number and their movement arranged so that while any three ladles were at the form pouring, the other three were at the furnaces being filled. Thus the flow was kept continuous until the pour holes showed the mold to be filled completely.

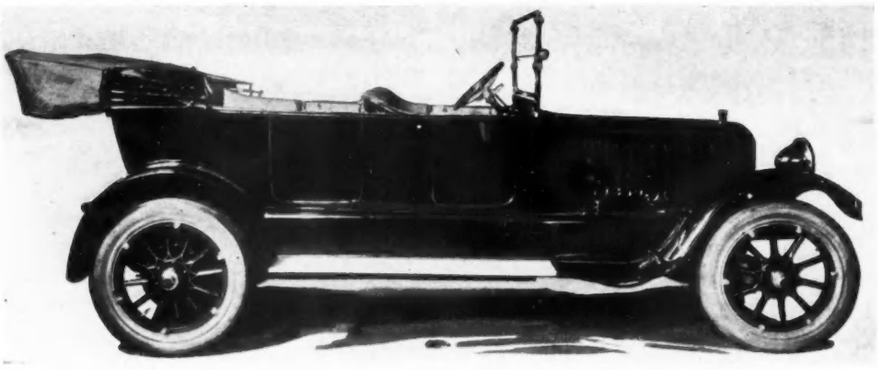


Making the mold for casting the two halves of the huge wheel simultaneously

In machining the big casting more difficulties had to be surmounted and firstly the joints where the two halves came together had to be smoothed down to a very minute exactness. A large draw shaper specially built to do such jobs was employed for this part, after which a big vertical boring mill was called upon to machine the hub and to turn down the diameter to its proper size. Of course, for these boring mill operations, the halves were joined.

Stanley Steamer Has Radiator Condenser

Wheelbase Increased 10 Inches—Drilled Burner Replaces Slotted Type—Brakes Enlarged—Many Refinements



The new Stanley steam car which differs radically from the previous product of the company

BY adding 10 inches to the wheelbase and placing a V-shaped honeycomb radiator at the forward extremity, the Stanley Motor Carriage Co., Newton, Mass., has entirely changed the outward appearance of its new product. In spite of this exterior revamping, the fundamental principles of Stanley construction are maintained in the new model, although a great number of refinements calculated to increase the efficiency of the vehicle have been added.

Drilled Burner Used

One of the most important features of the new car is the drilled burner used instead of the former slotted type. By the use of this new burner the Stanley company has found it possible to secure 30 per cent. more power from the same boiler than that used last season. In fact, it was at first intended to replace the boiler of last year by a larger design, but the new burner has worked out so satisfactorily that the desired amount of power has been secured without any increase in tube surface. It will be remembered that this boiler is a vertical fire tube of 750 1-2-inch tubes. A minor improvement has been made in the boiler, also, by brazing the tubes on the inside, thus enabling the tubes to carry off a greater amount of heat should they become empty through accident and thereby greatly decreasing the danger of burning out the boiler.

The same type of pilot-light system as was employed in the 1914 model 710 Stanley is found in the 1915 model 720. This is an independent system in which a separate source of fuel is used under independent pressure and under ordinary circumstances will burn for about 4 days without attention.

Automatic Feed-Water Control

Another refinement which will be found in the new car is the use of an automatic feed-water control for increasing or decreasing the supply to the boiler. The hand control employed on former Stanleys is continued and the driver is therefore perfectly free to adjust the water supply according to his own ideas. Should he not care to pay any attention to the water level the automatic device will take care of this for him.

Radiator as Condenser

It is in the use of the honeycomb radiator that the biggest change has been made. By the successful employment of this type of condenser the car may travel 200 miles on one filling of the 24-gallon water tank. Last year the amount of water carried for a trip of this length was considerably greater thereby adding much to the weight of the car. The successful use of a radiator condenser has been a stumbling block in the way of steam-car designers for a long time due to the fact that since the lubricant is introduced into the cylinders it is naturally carried with the steam exhaust into the radiator, forming a deposit on the interior surface of the cooling medium, thereby rapidly cutting down its efficiency and soon clogging the entire system.

The method by which this difficulty has been solved is in the use of a graphite lubricant in which the graphite is carried in a deflocculated condition. In addition to this only enough oil to prevent the cylinders from rusting is introduced, 1 gallon sufficing for about 500 miles.

Left Drive Adopted

Owners of former models of Stanley steam cars will not note a great difference in the control except that it has been shifted to the left side in response to public opinion as exemplified in the greater number of cars now on the market. The steering gear is a new Warner design this season and the brakes are 14 by 2 inches, which is a larger size, although the car is said to be of less weight due to the use of an aluminum body, the carrying of only 24 gallons of water instead of 40 and the lighter construction in the body itself. Another feature of the new model is the use of the Splitdorf-Apple system for electric lighting. A very simple installation of this has been made as it has been geared directly to the differential, thereby adding only one moving part, the armature of the dynamo.

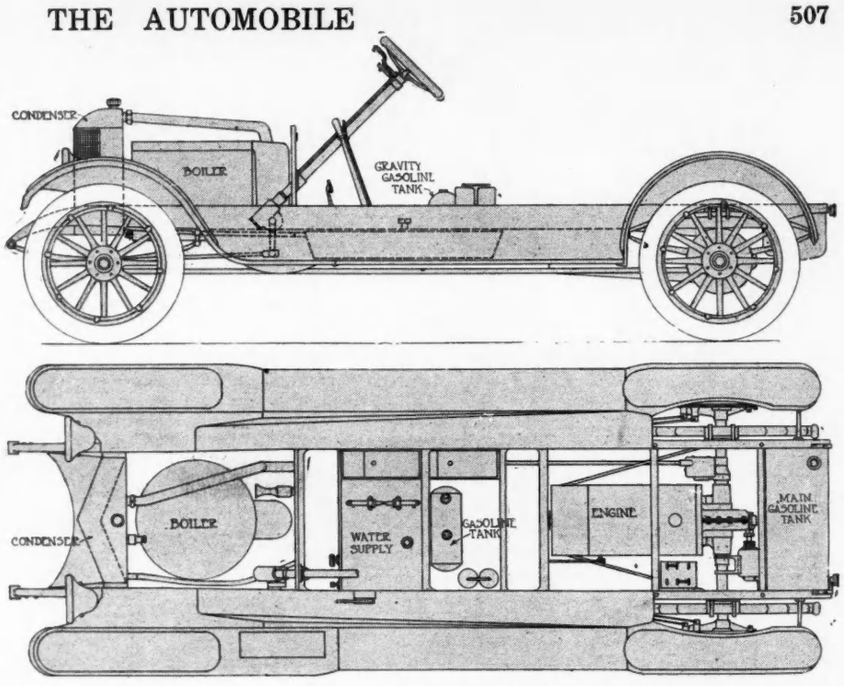
Pumps Driven from Axle

Another new departure from previous Stanley practice is to drive the pumps for fuel and water from the rear axle instead of from the engine. A more efficient pump has been secured and one in which noise has been eliminated by having a longer stroke at one-quarter engine speed. The changing of the pumps was not due, however, to difficulty with the engine installation used last season, but was a necessity to meet the changed position of the water tank which is considerably lower, due to its mounting underneath the condenser. In the engine itself only one change has been thought wise, and this is the installation of plain bearings instead of ball bearings in the cross-head. The Stevenson link motion for the valve has been continued.

Detail Refinements

The above review of the changes are the most radical departures from previous practice although throughout the

chassis other detailed refinements will be noted. For the general facts of Stanley construction it may be noted that the Stanley Motor Carriage Co. builds but one type of passenger car, this being the five-passenger touring type illustrated. The engine is rated at 20 horsepower, although, due to the characteristics of the steam-propelled power plant, horsepower is merely a question of steam pressure and torque, a question of the steam pressure and point of cutoff. Steam is admitted to the cylinder for about one-quarter stroke during ordinary running and expanded for the remainder of the strokes. In starting the links are shifted over and steam is admitted for practically the entire stroke. There are only two positions utilized on the Stevenson link motion in this engine.



Above—Elevation of new Stanley steam car chassis, showing new radiator-condenser
Lower—Plan view of the new Stanley, showing layout of radiator-condenser, boiler, engine and drive members

Narrow Turning Radius

The wheelbase of the new design is 130 inches, but, due to the use of the V-radiator, it has been found possible to narrow the frame at the front end, allowing a shorter turning radius than the previous model which was 10 inches shorter. The engine is bolted rigidly to the rear axle and is braced from the front of the engine back to the mounting, thus making a single unit of the engine, differential and rear axle. The suspension of the car is unique in that the body rests on a built-up platform made up of the two axles and perch rods through which the drive passes.

The unit formed by the engine differential and rear axle is attached to the car by a three-point suspension method, each of the points of attachment being an oscillating bearing.

The frame is of channel steel and the springs are semi-elliptic front and elliptic rear. The rear axle is carried on Timken bearings and the front is also a complete Timken unit.

Blow-Off Valve on Radiator

In operation, the water, which is the medium of power, passes through the following cycle. From the water tank it passes through the feed water heater, thence to the boiler and in the form of steam passes into the cylinder where it expands. The exhaust steam from the engine passes into the radiator and is condensed there, the water immediately draining into the tank below, so that when the steam ceases to pass into the radiator, the latter becomes empty and dry. An overflow pipe in the top of the water tank allows any steam coming into it to escape and on the radiator a blow-off valve set at a very low pressure prevents this unit from being subjected to any injurious internal pressure. While running at an ordinary speed on fairly level roads, very little steam is ejected from the water tank.

Electric Lighting System

The price of the model 720 complete with full equipment is $1,975 f. o. b. Newton. The body, as stated, is full aluminum five-passenger fore-door design. The doors are 19 inches in front and 20 inches rear. The front seat is 44 inches wide and 18 inches front to rear. The cushions are 8 inches deep. The rear seat is 48 inches wide, 20 inches from front to back and has 10-inch cushions. The tonneau space is 30 inches from the back of the front seat to the front of the back seat. A one-man top, side curtains, clear-vision windshield, and the electric lighting system with a Willard 6-volt 80-ampere battery and a full set of lamps are included with the equipment. The body and wheels are a dark blue with fine gray striping, while the running gear is black, an attractive combination.

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Boiling Point Standard for Gasoline?

NEW YORK CITY, March 12—The Standard Oil Co. has entered upon a campaign to educate the public to gauge its fuel not by specific gravity or rather by Baumé, but by boiling point instead. The first gun in the campaign sounded recently when an almost inconspicuous note appeared simultaneously in a number of newspapers throughout the country. This was labeled S. O. Gasoline Reader No. 1, which would indicate that it is to be followed by others of a similar nature.

This points out that gasoline of low gravity really is more desirable than gasoline of high gravity, because it contains a greater number of heat units and therefore has more latent power, and that boiling point is the only true test of the quality of gasoline intended as fuel for internal combustion engines.

With the first of these contentions, the independent producers would seem to have no quarrel; they do not attempt to controvert this physical fact. But they are by no means agreed that boiling point—in the particular way in which it is referred to by the Standard Oil Company—can be used as an accurate indication of the quality of fuel.

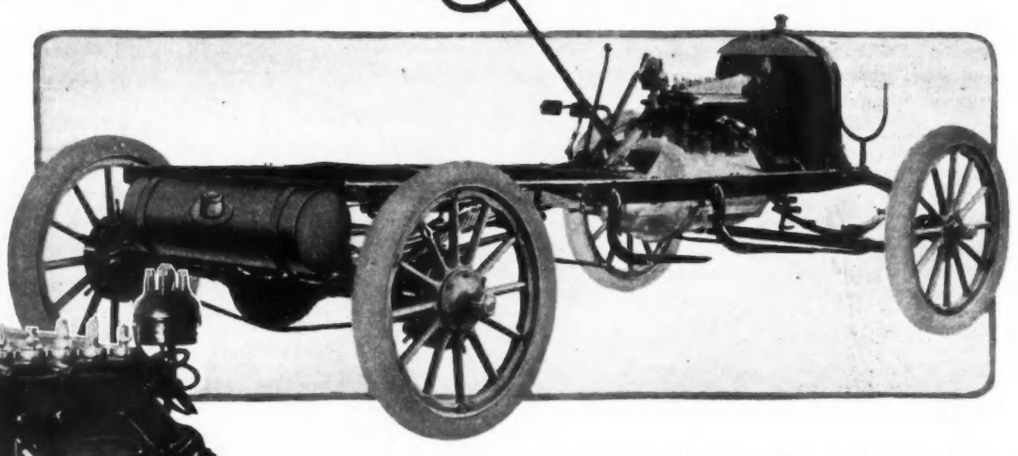
The independents point out, for example, that the initial boiling point and the final boiling point are entirely different factors, and that both should be used as a gauge of quality. These two temperatures should be nearly equal, state the independents, to indicate that gasoline is of good quality. And this contention is upheld by the Standard, which states in its notice: "The first requisite of a motor fuel is that it be a homogeneous, straight-distilled product." This means the gasoline which is obtained from a straight cut of one fraction of the crude during the process of distillation. In other words, it is impossible to obtain a truly homogeneous mixture by adding high gravity gasoline to low gravity gasoline in order to raise the average gravity.

It is pointed out by the independents that there is no difficulty in obtaining a low initial boiling point with blended gasoline of this kind. But when gasoline is blended, the lighter fuel is used up first and the residue contains a certain percentage of heavy oil and carbon, the first causing difficulty in starting and the last causing deposit. It is the presence of these heavier fractions which raises the final boiling point. From which it becomes clear that it is the final boiling point temperature, rather than the initial boiling point temperature, which should be used as a gauge.

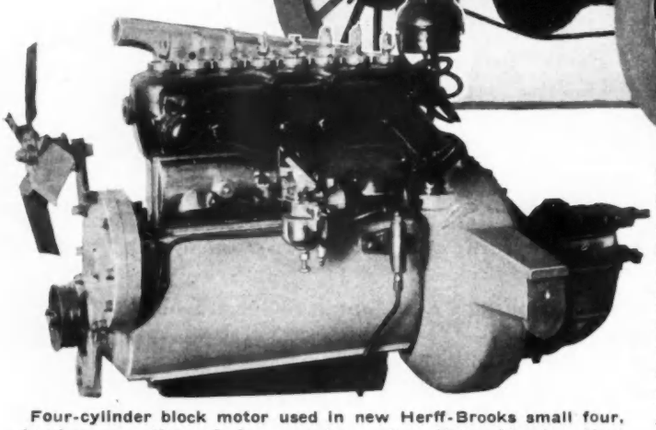
The Standard Oil Co. states that typical figures for average motor fuel would be an initial boiling point of 110 degrees F. and a final boiling point of about 340 degrees F. These are for "straight distilled" gasoline. "Blended" gasoline may boil at as low a temperature as 70 degrees or 80 degrees F., but the final boiling point likely will be as high as 500 degrees F.

Herff-Brooks Adds a Small Four Chassis

New Car Has 106-Inch Wheelbase, and Block Motor—Model 25 Brings Vacuum Fuel Feed Line to Three Cars



Three-quarter view of Herff-Brooks small four chassis, showing layout of control units



Four-cylinder block motor used in new Herff-Brooks small four, showing mounting of fan, gearbox, etc. Note Atwater Kent distributer

TO supplement the six and four-cylinder cars put out by the Herff-Brooks Corp., Indianapolis, Ind., a new small four has been announced under the name of model 25. This car is in the low-priced class marketing in touring form with all equipment at $765.

Five-Passenger Design

Although essentially of light car type, this car is of ample size to carry five passengers, having a 106-inch wheelbase and a power plant of sufficient dimensions to carry the consequent weight. The motor is a Perkins design, having its L-head cylinders cast in a block. The bore is 3.25 inches and the stroke 4.5. Referring to the accompanying illustration, it will be noted that the valves are on the left side and are covered by two plates which are removable by the use of two large cam screws.

The motor is of clean exterior appearance having the intake and manifolds contained in a single casting. The carbureter is quite high and although on the same side as the valve cover plates, it does not interfere with their removal and still allows an accessible arrangement of the carbureter adjustments and mounting.

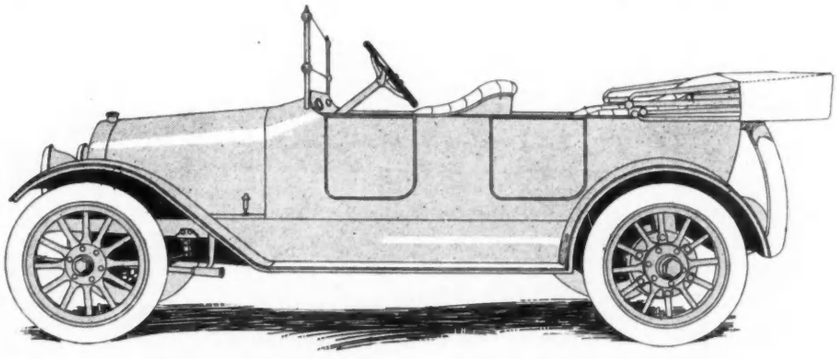
Three-Point Suspension

The power plant is a unit with three-point suspension. It has an aluminum crankcase and the housing of the gearbox which bolts directly against the crankcase bell housing is also of the same material. Cooling is by thermo-syphon and the radiator is tubular in form. Ignition is by a single-battery system with an Atwater Kent distributer. The carbureter is a Holley and is bolted directly to the manifold flange without any separate interposed header. Throughout extreme simplicity is used in all the connections. The casting which contains the intake and exhaust manifold is bolted directly against the cylinder casting by stud bolts, and the fan bracket is held in place by two bolts which are simply elongated timing gear housing bolts.

The clutch is a leather-faced cone, having engaging springs beneath the leather facing. It transmits the power of the motor to a three-speed selective gearset mounted in the same housing with the clutch. The gears in the gearset are nickel-steel and the bearings on the main driveshaft of the gearbox are New Departure ball. The drive is taken by shaft through two universal joints through a Salisbury floating rear axle equipped with both ball and roller bearings. The wheels are artillery design of hickory and are fitted with 30 by 3 1-2 Goodyear tires on demountable rims.

Vacuum Fuel Feed

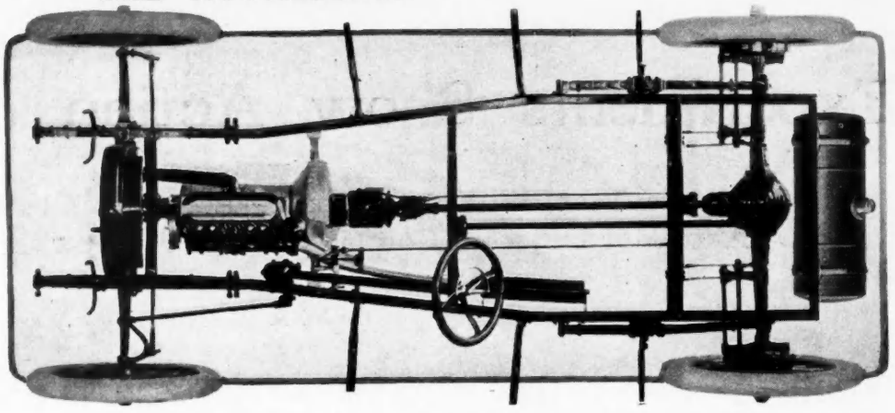
The gasoline feed is by the Stewart vacuum system carrying the main gasoline tank at the rear in the customary manner and feeding to the carbureter by gravity from a small tank placed behind the dashboard. Disco starting and light-



The new Herff-Brooks small four five-passenger touring car

ing is part of the equipment included in the fixed price. The brakes are in two sets, both acting on the rear wheel drums, the service being an external contracting design operated by pedal and the emergency controlled by hand lever. This brake is internal expanding. The front axle is a drop-forged I-beam carrying the spring pads for the semi-elliptics as a unit. The rear spring suspension is by cantilever.

The tread is standard 56 inches, the wheelbase 106 inches and the body is finished in black with running gear of the same color. The wheels are natural wood finish. The equipment includes electric starting and lighting, head, tail and dash lamp, electric horn, one-man mohair top, two-piece ventilating windshields, Stewart speedometer, demountable rims, one extra rim, robe rail, tire irons, tire straps, tire repair kit, tool kit, jack, pump and other usual equipment.



Plan view of new Herff-Brooks small four chassis, showing tapered frame and simple, but strong, construction

Automobile Trades Assn. of Colorado Formed

DENVER, COL., March 12—The Automobile Trades Assn. of Colorado has been incorporated by the following six Denver dealers in automobiles and accessories: W. W. Barnett, R. C. Peete, Tom Botterill, R. R. Hall, J. D. Quinn and E. H. Bull. The chief objects of the organization are to encourage cordial relations and active co-operation for mutual benefit among all Colorado dealers in automobiles and allied lines, to improve trade methods and practices, to gather and dispense useful information for advancing efficiency in the establishments of members, to establish and maintain a credit bureau, to give each branch of trade represented better chances for development, to affiliate and co-operate with other trade organizations throughout the United States, to secure concerted action relative to legislative matters affecting the industry, etc.

The officers are as follows: President, C. T. Bruckman; first vice-president, J. W. Foster; second vice-president, H. P. Sebolt; treasurer, Tom Botterill; secretary, R. C. Peete. Headquarters were opened yesterday in the Majestic Building in this city.

20,000,000 Feet of Brake Lining

A PORTION of automobile make-up that is perhaps seldom thought about is the brake lining; if one thinks of it at all it is as a petty detail, yet the manufacture of woven asbestos material for lining automobile brakes has become quite a large industry. There are now in use something like 2,000,000 automobiles in this country alone, and there are only a few that have not woven lining in the brakes, so there is at least 20,000,000 feet of brake lining in use, for the average length taken to line all four brakes would not fall far short of 10 feet.

Tremendous Production

Every driver knows that the linings of the brakes are not expected to last for more than a certain number of thousands of miles, and few cars find their way to the junk heap till they have used up a good many linings and relinings, which means that, allowing for the new cars being made in the factories and the old cars in the repair shops, the annual consumption of brake lining is probably about equal to the total amount in use. It is easy to see that the production of even 1,000,000 feet of brake lining is a fair undertaking, let alone 20,000,000; that such an output must give employment to many men, call for a deal of capital investment and be a large, interesting business. The huge total quantity explains why so many different concerns have entered the field and accounts for the size of the principal specializing factories.

How Brake Lining Is Woven

Brake lining is woven on a loom just like any other kind of ribbon, only instead of using threads of cotton or silk, each strand is a strong brass wire covered with asbestos. Weights or springs put a heavy pull on each thread and the shuttles oscillate to and fro, weaving the strands together as they are drawn slowly through. This work calls for looms of heavy, strong construction, and the hard nature of the threads is troublesome in several ways, one of the greatest difficulties having been to ensure the width and thickness of the lining within fine limits. Experience has now made it possible to work to thousandths of an inch on the weaving, while small errors on the material as it comes from the looms can be corrected in the rolling process which follows. This rolling has for its purpose the consolidation of the material, which comes from the rolls even harder than it left the looms.

There is a good deal of difference in the kinds of asbestos which are dug up from various parts of the earth's surface, and the sort preferred for brake lining manufacture is that in which the natural threads are of good length. These threads are twisted around the wire center by automatic machines, the original purpose of the wire being to act as a carrier which will permit the close weaving of the asbestos. The impregnation with the brown binder used for most linings is for the purpose of holding together the asbestos after it is woven, it assists the wire when use of the brakes wears through the strands, and the added stiffness given by this "glue" makes the lining easier to cut, drill and rivet to the brake.

Apart from linings for brakes, quite a quantity of the same kind of material is being demanded for clutch lining, especially for dry disk clutches, and it is now customary for the disks to be made up in finished form from lining specially woven for the purpose. Of course, the consumption of clutch lining does not compare in any way with that of brake material, but it is considerable.

It is often assumed that one brake lining is much the same as another, that the different makes are different only in name, but this is very far from the truth. There are good, bad and indifferent materials just as in other kinds of goods and the best brands cost most to make.

Experiments Show Action of Mixtures

Simple Tests with Inexpensive Materials Clearly Illustrate Action of Different Combinations of Air and Gasoline Vapor

By H. S. Webb

AN idea of the behavior of rich, lean and and perfect mixtures of gasoline vapor and air when burning, and a demonstration of the fact that gasoline vapor is heavier than air, which must be taken into consideration in ventilating garages, can be arrived at by the following very simple experiments. These experiments are not dangerous in the least. The apparatus is shown in Figs. 1, 2 and 3. It consists of a metal can, such as a medium size ordinary baking powder can, and a piece of sheet metal somewhat larger than the can, and notched at the edge. The zinc cup of a dry battery will answer equally as well as a can. The top of the can is not needed. The gasoline can be handled with perfect safety if put into a small oil can, such as is used for typewriters and sewing machines.

Temperature a Factor

The place where the experiments are made should be free from draughts of air. It is assumed that the temperature is about the same as that of an office or living room. If the temperature is higher, the vaporization of the gasoline will be more rapid and the experiments will require less time. If it is colder, it will take longer for the gasoline to vaporize, but the can can be kept warm by burning some additional gasoline in it, and this will expedite the work. If the can is very cold, the vaporization is apt to be so slow that considerable of the vapor will leak out unless the cover is a very close fit.

The quantities of gasoline to be used are given for a can about 3 inches in diameter by 5 inches high. Blow into the can or move it rapidly through the air after each experiment to remove the burned gases after the flame has burned out.

1—Set the can on a table so as to stand upright and drop two large drops of gasoline into it on the bottom. Let it stand 15 or 20 seconds for the gasoline to evaporate or vaporize. Then apply a lighted taper or splinter of wood long enough to reach down to the bottom of the can readily. If there are no air draughts about the can, the light will have to be put well down toward the bottom before the vapor will ignite. If the vaporization has been complete, the mixture will burn rapidly with a blue flame and a gentle puff or explosive sound.

If the mixture lights near the top of the can it is probably on account of air curents stirring it up. In such a case try the experiment again, but put the sheet metal plate over the top as soon as the gasoline is dropped in, so as to cover the can closely and cut off air draughts. The notch in the cover should be beyond the can so as to leave no opening. Leave standing half a minute or more, then remove the cover by sliding it off and immediately apply the light. Even if the can is left standing several minutes it will be found that the vapor is still at the bottom and will not ignite till the light is put well down into the can. If it lights near the top, try again with less gasoline. With a small enough quantity of gasoline, and the can closed air-tight as with a rubber seal, so that there can be no possible air circulation between the interior and exterior of the can, the vapor will remain at the bottom a long time.

2—Put two drops of the gasoline into the can again, lay the cover on so there will be no leakage and shake the can while holding the cover in place. This will distribute the gasoline throughout the can by giving it a circulation throughout the interior. Continue the shaking for 10 or 15 seconds and at the end of the time when the mixture is thoroughly distributed, place the can on the table, and immediately slip the cover off and apply the light. The mixture will light at the top of the can and the burning will be more rapid than before.

3—Put in four drops of gasoline, lay the cover on the can and leave for 2 or 3 minutes; then slip the cover off and apply the light. The mixture will ignite at or near the top of the can. The burning will probably be more gentle than in 2, especially toward the finish.

The increased amount of gasoline produces a correspondingly greater amount of vapor. A given volume of air, as a cubic inch, can absorb only a certain maximum amount of vapor, just as water cannot dissolve over a certain amount of salt. The vapor, being in greater quantity, therefore, rises higher in the can.

4—Put in four drops again and follow the same procedure as in 2. The burning will be more rapid than in any of the preceding cases.

Too Rich—Incomplete Combustion

5—Put in ten drops and proceed as in 2. The burning will be slow and the flame yellow or incandescent part of the time. This is because there is more vapor than the air in the can will burn. More air generally circulates into the can and completes the burning, although there may not be enough circulation in some cases to burn all of the gasoline.

6—Put in two drops of gasoline and immediately invert the can on the plate so that it is closed. Set them together on the table so that the notch in the plate projects over the edge of the table, the can still inverted. Let them stand for ten or fifteen seconds, then slip the can over the plate so as to cover most of the notch, the can still resting on the plate. Apply a light at the notch. A weak explosion will follow, and the can may be lifted slightly by it. This shows increase of pressure by combustion; also that the vapor of gasoline settles to the bottom of the can.

7—Put in four drops and proceed as in 6. The explosion will probably be stronger than in the case of 6.

8—Put in four drops again, cover the can and shake. Then place the inverted can on the table as before and light immediately. The explosion will probably be stronger than in any other of the experiments.

9—Put in ten drops of the gasoline. Otherwise repeat 8. The explosion will be gentle, and the flame shot out will be white or yellow, part of the time. Immediately apply the light again if the flame does not continue around the edge of the can; a second, but less strong, explosion will follow. This can generally be repeated several times. Sometimes a second explosion will immediately follow the first of its own accord.

The cause of the second explosion in either case is that there is more vapor than the air will burn at first. After

the first explosion the immediate cooling of the hot gases still in the can draws in fresh air and a second combustible mixture is formed. Sometimes the first mixture is so slow-burning that the flame is still continuing in the upper part of the can when the gas cools and contracts enough to draw in the fresh air. This lingering flame ignites the fresh mixture.

10—Put in twenty drops or more of the gasoline. Shake well, invert the can on the table with the notch covered by the can as before, and apply the light. The mixture will ignite quietly around the lower part of the can where it is leaking out, and burn quietly. It will not explode on account of being too rich to burn before it is diluted with air.

Alcohol Slower to Vaporize

The experiments can be carried out with alcohol, but more alcohol will have to be used and longer time allowed for vaporization. The flame will always be blue with alcohol.

Conclusions

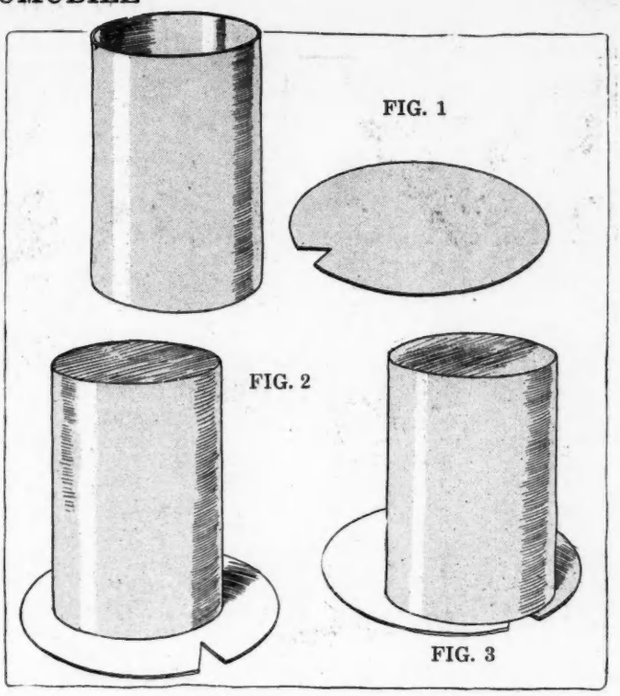
The first and sixth experiments show that gasoline vapor remains, or settles, to the bottom of the inclosing space. It is evident, therefore, that a room cannot be ventilated so as to carry off gasoline vapor by openings at the ceiling; but that openings through the floor or under the bottom of a door will allow the vapor to pass out. The room can also be ventilated by a flue whose bottom opening is at the floor when there is a current of air passing up through the flue. There may be no natural draught up the flue in damp, heavy weather, so it must then be induced by some artificial means, as a fan or steam coil in the flue.

The second and fourth experiments show that air currents will carry the vapor through the entire body of the air in the enclosed space, and that the entire volume will become a combustible mixture if the right proportion of gasoline is vaporized.

The seventh and eighth experiments, compared with the sixth and ninth, show that increasing the amount of gasoline from a minimum up to a certain extent also increased the strength of the explosion, but that an excessive amount of gasoline not only does not give a stronger explosion, but a weaker and slower burning one.

The tenth experiment shows that a very rich mixture will not explode at all. If the mixture were entirely cut off from communication with the outside air, as in an engine cylinder, it would not even ignite. As the experiment is carried out there is always a small proportion of combustible mixture where the air and rich mixture meet and the light is applied.

It will be found that when there is not an excess of gasoline vapor present so as to cause a yellow flame, the blue flame will scarcely affect the brightness of the metal of a polished can. But when the over-rich mixture is burned with the accompanying yellow flame, there will be a decided black deposit of carbon on the sides of the can.



Apparatus consisting of a tin can and cover with a notch cut in it necessary for these experiments

Recent Court Decisions—Must Pay for Injuries

By George F. Kaiser

IN Wisconsin a party in a law suit who desires a jury must pay a $12 fee.

A motor company recovered a judgment of $93.35 for repairs and storage of an automobile. The court held that the Wisconsin statute providing that the party who demands a jury must pay $12 as a jury fee, which he may recover from the other party if he is successful in the action, is not an unreasonable regulation of the right to a jury trial guaranteed by the Constitution, which provides "Every person . . . ought to obtain justice freely and without being obliged to pay for it."—*Reliance Auto Repair Co. vs. Nugent*, 149 N. W. (*Wisconsin*) 377.

15 M. P. H. Negligent on Slippery Streets

A livery man sued a motorist for damages arising out of a collision between an automobile and a team and carriage. One horse was killed and the carriage and harness were damaged. The automobile was also considerably damaged. The livery man recovered a judgment for $250. The automobile was going west at a speed of 15 to 20 miles per hour and the carriage was going north. The automobile skidded and nearly turned over, crashing into the team and carriage.

The court held that, as the accident happened at the intersection of streets where there was a great deal of traffic, knowledge on the part of the operator of the automobile that the streets were wet and slippery was evidence that the accident was his fault.—*Right vs. Young and Warnock*, 170 *S. W.*, 25.

Insurance Company Pays

A motor car owner's right of recovery on a theft policy was upheld in a recent New York decision.

The action was on an insurance policy on the ground that the car was stolen and afterwards destroyed.

The car had been taken to a paint shop to have some work done upon it. The painter's brother took the car, after he had asked for permission to use it and been refused, and, while he was driving it had an accident in which it was destroyed.

The court held that, as the policy insured the owner against loss by theft of any person other than those in the employ, service, or household of the insured, the insurance company was liable and would have to pay.—*Troy Automobile Exchange vs. Home Insurance Co.*, 149 *N. Y. S.*, 978.

Starter Wagner giving the flag to Resta, in the Peugeot, as he crossed the finish line, winner of the Vanderbilt Cup

Resta's Generalship Won Vanderbilt

Rough Course Kept Speed Low but Brings Out Skill of the Drivers—Police Work Well Done

By A. G. Waddell

SAN FRANCISCO, CAL., March 8—For the seventh time a foreign built car has won the Vanderbilt Cup. The course, with its rough planks and sharp turns, provided a thorough test for both driver and car, and Resta and his Peugeot are deserving of much praise. While the Grand Prize, raced over the same course last Saturday, was more a race of drivers' endurance than of the speed of machines, the Vanderbilt combined both. The distance called out every ounce of pluck and fight in the drivers, and the speed attained gave an opportunity for the carefully-wrought mechanism to show its worth.

Compared to the 87.8 miles per hour averaged by Pullen in the Corona road race last November, the 67.3 miles averaged by Resta looks puny. But even those who have seen nothing but a map of the course realize that to attain this speed the drivers must have been forced to travel at close to 80 miles an hour on the straightaways. And when it is known that the longest of these is less than a mile, some conception of what 67 miles an hour means can be had. Add to this two right-angle turns, a sharp loop around a status, a 45-degree turn following a straightaway and some thousands of bumpy planks which floor a hairpin curve and you have a fair geometrical picture of the Exposition track.

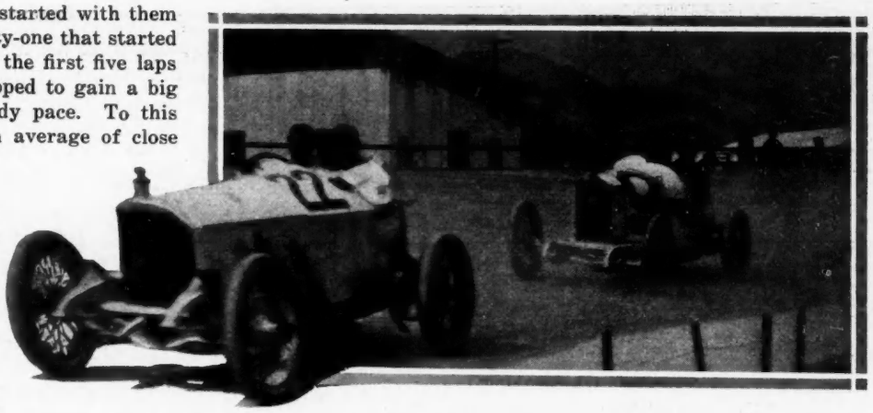
Someone said that the course was the finest in America for the reason that it required great skill on the part of the driver. But it requires more than mere skill. Any skilful driver could get around the course without trouble if he took his time, but if he made the round at a 50-mile an hour pace he would have to add to skill a dash of daredeviltry. The man who mentally pictures smash-ups when his car begins to skid has no place on the Exposition course. The barest whisper of fear in the mind of the driver would be cause for an accident.

No delays or hitches discontented the spectators at the Vanderbilt. The race had been set at 12:30, instead of 10:30, early in the week. By 10 o'clock over 18,000 spectators had paid admissions to the grounds and by noon the number had risen to 50,000. Before the race was done 100,000 people had gathered along the track. Without the excellent policing furnished by the soldiers from the Presidio accidents to the spectators would have been inevitable. In place of the call of "car's coming" and a scurrying and running to clear the track, the course was always clear and at the most dangerous corners spectators were held 15 feet from the track. The courteous, efficient work of the 348 guards was a credit to both the army and the Exposition officials.

Shortly after the start Mrs. William K. Vanderbilt, wife of the donor of the cup, entered the stand and became an enthusiastic spectator. Her box was directly above that occupied by Governor Johnson. Mayor Rolph, of San Francisco, was as excited as a small boy and found that even his office could not move the guards. The mayor arrived late, just after Starter Fred Wagner had given orders that no one should be allowed to cross the track. The obdurate guard refused to be moved by the dignity of silk hat and a swallow-tail, so Wagner came to the rescue.

It was rather odd that Resta, winner of the cup, and De Palma, twice holder of the trophy, should be in the first

three to start. The Chevrolet which started with them went out, but the first two of the thirty-one that started finished in the money. The pace for the first five laps was terrific. Tom Alley evidently hoped to gain a big lead and then settle down to a steady pace. To this end he tore around the course at an average of close to 75 miles an hour for five laps, or about 20 miles. The pace was too great. Alley soon found it out and settled down to a more sane speed. All this time Resta hummed along, not in the least worried over the burst of speed by the Duesenberg. He was apparently concerned with but one thing—to keep his Peugeot running steadily at an even pace. That he accomplished this may well be seen from the time reports which show Resta continually in the front after Tom Alley settleddown.



Ralph DePalma in his Mercedes having a brush with Resta in the Peugeot. DePalma finished fourth

Rickenbacher, in the Maxwell, also had his burst of speed at the first and then went out. He was the first to make a round of the course and for a time he and Resta engaged in a brush which provided some pretty racing on the straightaways. But Resta's tactics were different from Rickenbacher's. Rickenbacher was out to pass the foreign driver and to lap him; Resta was content to speed up only enough to keep himself abreast of his competitor and not to pass him. Resta appeared to drive with his eyes on a stopwatch, Rickenbacher with his eyes on the car ahead of him.

Then Pullen drew into the contest and began with Resta a forty-lap brush which called cheer after cheer from the spectators. But the story was much the same. Resta would not be drawn out into a too dangerous pace. He held his own and was satisfied. He was racing against time, not against cars. DePalma seemed to feel much the same way about the contest. He was wise enough to know that great speed was foolish. He drove smoothly and carefully, always alert, but taking no unnecessary chances and coming in for the money when many of his more reckless race-mates were lying wrecked along the course.

Shortly after Pullen had begun his fight with Resta, Ruckstell worked up into a position where he could contend with the winner. The safe lead that Resta had attained by this time made him pay even less attention to Ruckstell than he had to Pullen. Ruckstell's efforts came to naught, however, for in the seventy-second lap he broke an axle and went out.

It was then that Wilcox and his Stutz had their big chance and took advantage of it with a great burst of speed. He overhauled Pullen and gained second place at the finish of the race because of the time allowance given for the start.

Carlson had trouble all through the race with a leaky radiator and lost valuable minutes at the pits in an attempt to repair it. The attempt was useless and several stops were made for water.

Much favorable comment was caused by the performance of the Overland, which finished twelfth. The Overland was the lowest priced car in the race and finished without a single stop for mechanical adjustment.

Hay Embankments Save Lives

Again the hay embankments at the turns and angles proved their worth. Edward O'Donnell and P. Henderson, driver and mechanician of the wrecked Duesenberg, owe their lives to a bale of hay. When their car struck the sand in front of the Indiana State building it began to do a fantastic dance, skidded wildly from side to side for 200 feet down the track. When O'Donnell and Henderson realized that the car was bound for the side of the track and that a turn-over was inevitable, they crouched in the cowl of the car and threw as much of their bodies out of the car as was possible. When the car stopped it lay on its back with the hood resting on a bale of hay. The space between the hay and the ground was all that saved the men from being crushed.

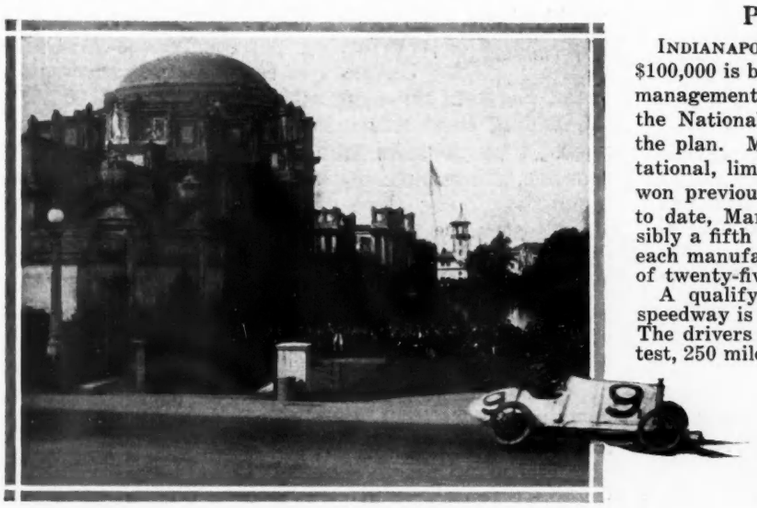
It was the same sand that caused Bob Burman to cut the top off of a 6 by 6 post as though it were a piece of match wood. He swung the big Case into the curve at a high speed, skidded and neatly clipped the top of the heavy post and then continued on his way.

—

Plan 1,000-Mile Race for $100,000

INDIANAPOLIS, IND., March 13—A 1,000-mile race for $100,000 is being planned by the Indianapolis motor speedway management. First prize will be $50,000. A. C. Newby of the National Motor Vehicle Co., this city, is the father of the plan. Mr. Newby plans to make the race strictly invitational, limiting entry exclusively to makes of cars having won previous 500-mile races. Four such makes are eligible to date, Marmon, National, Peugeot, and Delage, with possibly a fifth after the next 500-mile race, May 30. Providing each manufacturer of those cars would enter five cars, a field of twenty-five cars would start the race.

A qualifying speed of 90 m.p.h. for twenty laps of the speedway is to be necessary, and the race is to start at 6 a. m. The drivers are to alternate driving the cars during the contest, 250 miles each, two drivers to a car.



Resta's winning Peugeot passing the corner of the fine arts palace at the Panama-Pacific exposition. The fine arts lagoon and two of the national pavilions are shown in the distance

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Better Springs Coming

SINCE the almost acrimonious discussion which took place at the winter meeting of the S. A. E. after the reading of the paper on cantilever springs little more has been heard on this subject, but whatever may be decided as to the theory of spring action and design, when the full discussion comes to be published there is no doubt but that new kinds of springs are in course of being tried out by most of the engineering departments in our automobile factories. In Europe it was found that the light car offered a particularly difficult problem for the spring designer, and it seems that the same experience is being had here, while it is also to be observed that the work of improvement which the coming of lighter chassis has rendered imperative has resulted in some discoveries that will be of value to cars of all weights.

In the whole history of automobile engineering there has never been a wave of interest in any one particular problem that has not had a good effect, ultimately; so we may safely rest assured that the average 1916 automobile will have a better suspension than its predecessor, but this does not mean that a boom in cantilever springs is to be looked for. It would be absurd to deny that there might be such a boom, but, be this how it may, the investigations now being made will show methods for improving all kinds of springs.

At the S. A. E. summer meeting the subject is sure to come up again, even if it is not included in the program, and we may then hope to hear the results of the researches now in progress. It is not to be expected that they will be spectacular in any way or that the knowledge gained will show up in exhibition halls. What is needed is agreement on the proportions of load, spring length, spring thickness, number of leaves, and so on, and the effect of thus widening the data possessed by the engineer and spring maker will only be noticeable on the road.

Lamp Bulb Standards

THE British Engineering Standards Committee has issued a report containing sundry recommendations as to standards for the bases of lamps used for automobile lighting, the sizes of bulbs and the voltages being also suggested subjects for standardization. No doubt the most important part of these standards is the regulation of voltage, and for this two standards of 6 volts and 12 volts respectively are put forward. This cuts out the 24-volt systems altogether and also the 8-volt, which has been popular in Europe for small cars. It is premature to attempt to pass a verdict upon these suggestions till the matter has been considered by the S. A. E. committee for similar standardization in this country, but it seems likely that the British recommendations will be hard to reconcile with American practice if the British decision is to fix upon the double contact lamp base. The natural feeling is that it is scarcely time to settle for or against the single contact system yet, that the two systems ought to be allowed a little longer to fight it out between themselves with the public as judge. Still any attempt to bring order out of the chaos that now exists among voltages and bulb patterns is to be hailed with acclamation since some reasonable standards would be of infinite benefit to users of automobiles, and still more advantageous to dealers who now have to carry a very complicated lamp stock.

Iowa as a Car Buyer

MANUFACTURERS with their fingers on the pulse of the buying powers of the different sections of the United States have not over-rated Iowa. Sixth in car registrations as it is, with 106,087 on its list, the surface has not been so deeply furrowed that there is any fear of a decrease in the number of car purchases. Des Moines alone, it was predicted at the close of the show, will distribute 20,000 cars during 1915. The accessory business that this carries along with it is almost as important as the car business because it endures from year to year, starting when the car is originally purchased and not ending until it is on the border of the scrap heap. Grumbling on the effects of the war is not heard in this state where the crops have increased in value $27,342,000 in a single year. What percentage of this surplus is available for the purchase of cars is beyond estimation, but the optimistic atmosphere at the show in Des Moines prophesies good.

United Kingdom Is Still Best Car Buyer

Purchased 1,389 American Cars in January, or 359 More Than in January, 1914—Asia and Oceania in Second Place

WASHINGTON, D. C., March 16—The United Kingdom still remains the largest buyer of American automobiles, the latest figures of the Federal Bureau of Statistics showing that in January King George's country bought 1,389 passenger cars valued at $1,770,966. In the same month of last year the purchases amounted to 1,030 cars, valued at $855,973. France's purchases in January last amounted to 236 cars, valued at $527,869, a large increase over the purchases for the same month of 1914, when sixty-three cars, valued at $47,506 were shipped to France. Under the head of Asia and other Oceania, the records show that 293 cars, valued at $808,793 were shipped there, as against 193 cars, valued at $163,641, shipped there in January of last year. Commercial vehicles showed a great increase, from forty-five in January, 1914, to 935 for the same month in 1915, the values of which were $74,491 in January, 1914, and $2,545,527 in January, 1915. For the 7 months ending January, 1915, both the commercial vehicle and passenger car exports totaled $16,707,541, as against $13,254,854 for the same period in 1914. Export of tires increased from $137,889 in January, 1914, to $353,914 for the same month in 1915. Great Britain's tire exports for that month amounted to $165,715.

Process for Making Synthetic Rubber from Crude Oil

NEW YORK CITY, March 13—By chance one of the chemists of the Baku, Russia, oil fields, in the course of fractional distillation of petroleum, recently discovered that certain fractions boiling between 98 and 106 degrees Centigrade yield about 20 per cent. of their weight in adipic acid, which is a compound formed by the action of nitric acid on fats.

It has been known for some time that adipic acid can easily be converted into butadiene, through its own amide, which is a compound derived from ammonia by replacing the hydrogen atoms with univalent acid radicals, and the discovery of an unlimited supply of adipic acid is very likely to be a long step forward in the production of synthetic rubber. Butadiene can be converted into caoutchouc by means of a simple and inexpensive process.

NEW YORK CITY, March 17—A paper entitled "The Internal Combustion Engine in the Motor Boat," by C. F. Chapman, associate editor of *Motor Boating*, will be delivered before the Metropolitan Section of the Society of Automobile Engineers, Thursday, March 25, at the Automobile Club of America.

Exports and Imports of Automobiles, Trucks and Accessories in January and Preceding 7 Months

	January				7 Months Ending January			
	1914		1915		1914		1915	
	Number	Value	Number	Value	Number	Value	Number	Value
AUTOMOBILES AND PARTS:								
Automobiles—								
Commercial	45	$74,491	935	$2,545,527	436	$714,261	3,972	$10,989,442
Passenger	2,481	2,174,392	1,803	1,313,153	13,553	12,540,593	6,904	5,808,099
Total	2,526	$2,248,883	2,738	$3,858,680	13,989	$13,254,854	10,876	$16,797,541
Parts (not including engines and tires)	....	$475,299	.....	$615,185	.....	$3,609,488	.....	$2,789,246
Total automobiles, and parts of	....	$2,724,182	.....	$4,473,865	.....	$16,864,342	.....	$19,586,787
BY COUNTRIES								
Automobiles:								
France	63	$47,506	236	$527,869	464	$361,803	2,024	$5,017,488
Germany	94	56,483	.....	.....	482	333,544	16	17,364
Italy	64	33,763	3	2,412	195	137,710	26	23,722
United Kingdom	1,030	855,973	1,389	1,770,966	3,512	2,805,325	3,448	4,758,702
Other Europe	175	121,245	130	229,065	889	713,091	701	1,894,278
Canada	370	423,093	263	226,533	1,895	2,659,482	1,378	1,890,693
Mexico	9	15,109	3	1,410	124	207,457	39	48,427
West Indies and Bermuda	58	50,651	102	66,980	334	312,745	468	341,012
South America	145	120,079	104	54,276	1,348	1,412,340	471	270,685
British Oceania	174	146,672	155	124,751	2,142	1,846,576	1,354	1,084,885
Asia and other Oceania	193	163,641	293	808,793	1,269	1,251,814	683	1,246,244
Other countries	151	214,668	60	45,625	1,335	1,212,967	268	204,041
Total	2,526	$2,248,883	2,738	$3,858,680	13,989	$13,254,854	10,876	$16,797,541
TIRES								
Belgium	....	.....	.....	.....	.....	$15,429	.....	.....
Germany	....	$2,940	.....	.....	.....	59,294	.....	$6,090
England	....	34,027	.....	$165,715	.....	804,635	.....	891,660
Canada	....	48,031	.....	41,317	.....	459,718	.....	358,066
Mexico	....	4,236	.....	12,197	.....	88,262	.....	60,856
Philippine Islands	....	9,110	.....	25,079	.....	94,162	.....	125,161
Other countries	....	39,545	.....	109,608	.....	361,181	.....	466,724
Total	....	$137,889	.....	$353,916	.....	$1,882,681	.....	$1,908,557
IMPORTS								
AUTOMOBILES AND PARTS:								
Automobiles .....No dut.	12	$40,754	14	$27,013	221	$508,784	219	$367,855
Parts of (except tires)..dut.	....	42,192	.....	69,149	.....	355,784	.....	536,955
Total automobiles, and parts of	....	$82,946	.....	$96,162	.....	$864,568	.....	$904,810
BY COUNTRIES								
AUTOMOBILES:								
France	7	$24,213	7	$16,419	99	$248,763	36	$86,853
Germany	....	.....	.....	.....	15	37,307	6	13,606
Italy	1	1,000	1	1,000	39	58,666	90	94,920
United Kingdom	4	15,541	3	4,947	34	105,676	53	133,453
Other countries	....	.....	3	4,647	34	58,372	34	39,023
Total	12	$40,754	14	$27,013	221	$508,784	219	$367,855

Massnick-Phipps Gets Wahl Plant

Perkins Motor Manufacturer Will Increase Force to 500 Men—Plans Output of 100 Motors a Day

DETROIT, MICH., March 13—The business of the Massnick-Phipps Mfg. Co., East Lafayette boulevard, manufacturer of the Perkins four- and eight-cylinder motors, has been increasing so rapidly of late that greater production facilities had to be found. This is now an accomplished fact, as the company has secured the plant of the former Wahl Motor Co., on East Congress street, thus providing 30,000 square feet of additional floor space and making the total more than 65,000 square feet. The working force will be increased to total 500 men, of which 200 will be employed at the Congress street plant where the motors will be assembled and tested. It is the plan of the company to increase its output to 100 motors a day. At the present time fifty are being made daily.

—

Paige Sales Gain Nearly 70%

DETROIT, MICH., March 13—There are now from 700 to 800 men working at the plant of the Paige-Detroit Motor Car Co., and the production will soon be 1,000 cars a month. Actual sales up to the end of the first week of March were nearly 70 per cent. greater than at the same time in 1914. The production is being increased as rapidly as possible in order to meet the increasing sales. Reports received from Paige dealers from every section of the country are said to be better as to the future outlook of business than at any other time in the concern's history.

—

DETROIT, MICH., March 12—Up to the middle of February, the General Motors Co. had produced and sold 20 per cent. more cars than it had manufactured in the same period of the 1913-14 fiscal year. Sales up to March 1 were 75 per cent. as large as for all the late fiscal 12 months and the 4 months of largest sales are still ahead of the company.

The company has $13,500,000 cash in the treasury, which is 40 per cent. more than a year ago.

—

Overland Action on Extra Dividend in April

PASADENA, CAL., March 12—John N. Willys, president of the Willys-Overland Co., states that no action regarding an extra stock dividend will be taken until early in April. No extra cash dividend will be paid at the present time. There was a rumor of a 50 per cent. dividend within 60 days. It is stated, however, that rather than a stock dividend in April, the management will announce that hereafter a more or less regular distribution of stock will be made each year in addition to the regular 6 per cent. cash dividend. In this way the stockholders will gradually receive the $5,000,000 common stock now in the treasury.

This method of distribution of the stock dividend, if followed, would entail but a slightly increasing demand on the earnings for dividends, whereas the issue of the $5,000,000 block of stock at once would add $300,000 per annum to dividend requirements.

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TOLEDO, O., March 16—The Willys-Overland Co. has declared the regular quarterly dividend of 1 3-4 per cent. on the preferred stock, payable April 1 to stock of record March 20.

—

Money Orders Exchange with South America

WASHINGTON, D. C., March 15—Negotiations are in progress for the exchange of money orders between the United States and principal countries of South America. A statement issued by the Postoffice Dept. said negotiations were well under way and probably would be consummated soon.

The department also announced that foreign exchange conditions had improved so much recently that it had been possible to remove the $100 limit on money orders for all countries except Austria, Belgium, Egypt and Portugal.

The Federal Reserve Board recently took up for consideration a request from the National City Bank of New York for permission to open foreign branches at Havana, Cuba, and at San Juan, Porto Rico. Branches have already been established at Buenos Aires and Rio de Janeiro.

Conditions in the United States are improving, especially in the Northwest, where the farmers are very optimistic over the crop outlook. Bank deposits have increased, $218,000,000 has been deposited in the banks of St. Paul and Minneapolis, Minn., showing a gain of $16,000,000 since December, and a gain of $26,000,000 since last March. Bankers of the two cities declared that never in the history of the Northwest were conditions so favorable at this season of the year.

—

NEW BRUNSWICK, N. J., March 16—The annual meeting of the stockholders of the United States Rubber Co. was held here today. M. S. Burrill, of New York City, and S. N. Nicholson of Providence, R. I., were elected directors to succeed D. L. McGibbon and H. S. Hastings, resigned. The other retiring directors were re-elected as follows: W. S. Ballou, J. C. Brady, N. F. Brady, M. Bun, S. P. Colt, H. E. Conzerse, J. Geshler, J. B. Ford, F. L. Hine, H. L. Hotchkiss, A. L. Kelley, Lester Leland, S. N. Nicholson, R. B. Price, H. E. Sawyer, W. H. Truesdale, T. N. Bail, J. W. Derneule and E. S. Williams.

The board of directors will meet in New York City on March 18 and organize by re-electing the present officers.

—

Canadian Rubber to Issue 10,000 Shares Pfd.

MONTREAL, QUE., March 8—At a meeting of the stockholders of the Canadian Consolidated Rubber Co., Ltd., today, the directors were authorized to issue 10,000 shares of additional preferred stock to be allotted to present shareholders at par. The directors were also authorized to issue 200 shares of preferred stock now held in the treasury. The company manufactures all kinds of rubber goods, including automobile tires.

The proceeds of the $1,000,000 additional preferred stock which is to be issued by the company will be used for working capital and not for any specific purpose. The terms under which the new stock is to be issued stipulate that the United States Rubber Co., which owns more than a majority of the present stock outstanding, will take whatever part may not be subscribed for by minority stockholders, in addition to taking its pro rata share.

Until this last action of the directors, the authorized capital stock of the company consisted of $3,000,000 common and $2,000,000 7 per cent. non-cumulative preferred. There was outstanding on January 1 last, $2,804,120 of the common and $1,976,780 preferred.

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CHICAGO, ILL., March 17—*Special Telegram*—Editor THE AUTOMOBILE:—The announcement made in newspapers that the Stewart-Warner Speedometer Corp., has been awarded the equipment contract on Ford cars is not based on fact. No such order has been placed although negotiations for partial equipment are under way, but nothing definite has been done.—Stewart-Warner Speedometer Corp.

—

Perrin Joins Continental Engineering Dept.

DETROIT, MICH., March 17—*Special Telegram*—J. G. Perrin, formerly chief engineer of the Lozier company, is now identified with the engineering department of the Continental Motor Mfg. Co. He first became associated with the Lozier interests when Lozier made bicycles. Later, he designed the first Lozier automobile and remained as chief engineer until the company became insolvent.

—

Owen Joins Forces with Houpt

NEW YORK CITY, March 12—Announcement is made today that Ray M. Owen, one of the pioneer sales organizers in the automobile industry, has joined forces with Harry S. Houpt through the purchase of a substantial interest in the Harry S. Houpt company. The latter concern is eastern distributor for the Mitchell car and will continue to act as such, in addition to which the Owen magnetic car will be marketed. While in New York City the Owen magnetic car will be handled independently, it will be the policy of Harry S. Houpt, Inc., to market both cars together at other distributing points.

—

MILWAUKEE, WIS., March 12—Prices for Stegeman motor trucks have been reduced from $200 to $350 on the different models, the 1 1-2-tonner being reduced from $2,100 to $1,900; the 2 1-2-tonner from $2,800 to $2,500; and the 3 1-2-tonner from $3,350 to $3,000.

Jeffery Has Order for 750 Trucks

French Government Orders 3-4-Ton Type to Be Delivered in 60 Days—Involves $1,000,000

KENOSHA, WIS., March 13—One of the largest orders for motor trucks to be granted an American manufacturer as an outgrowth of the European war is the requisition booked by the Thomas B. Jeffery Co., Kenosha, Wis., last week. The order is from the French government and calls for the delivery of 750 Jeffery 3-4-ton trucks within 60 days. The contract involves about $1,000,000 and was procured by H. C. Hill, who went to Paris several months ago to seek war business for the Jeffery company. Several hundred additional operatives were employed last week and it is the intention of the company to reach a daily production of thirty cars a day on this order alone.

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NEW YORK CITY, March 15—Word was received here today that forty trucks had been sold to the government of Portugal by I. M. Lewis of the Bessemer Motor Truck Co., Grove City, Pa. Mr. Lewis secured the order in London.

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TROY, O., March 13—The Troy Wagon Works Co. has secured contracts aggregating $500,000 for motor truck trailers to be used by the warring nations of Europe. These contracts are in addition to the regular business which is showing a good increase.

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SYRACUSE, N. Y., March 13—At a recent meeting of the directors of the Chase Motor Truck Co., this city, it was decided that this company would not accept any future business for motor trucks to be shipped to the warring nations.

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DETROIT, MICH., March 13—The Federal Motor Truck Co., which is now employing 150 to 175 men, is operating to full capacity and reports increase of business of 20 per cent. during the first 2 months of this year as compared with January and February, 1914.

Market Reports for the Week

NEW YORK CITY, March 17—Changes in this week's market prices were few, but in several of them they were important, for instance, in the case of linseed oil, which has remained at 60 cents for a number of weeks, there was an increase of $0.02; in Pennsylvania petroleum, there was a loss of $0.05; in lead, which there was an advance of $3.00 per ton; and in tin which closed at $52.00 per 100 pounds, there was a gain of $8.00. The markets for the above products were strong and steady. The scarcity of tin and the irregularity at London, were responsible for its rise. Business in electrolytic copper, as well as in standard, was small. Antimony is held firm at 21 cents. No change occurred in Fine Up-River Para.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.20	.21	.21	.21	.21	.21	+.01
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer Steel, ton.	18.00	18.00	18.00	18.00	18.00	18.00	.....
Copper, Elec., lb.	.14⅜	.14⅜	.14 13/20	.14 13/20	.14 13/20	.14 13/20	+.00 1/20
Copper, Lake, lb.	.14⅝	.14⅝	.14⅝	.14⅝	.14⅝	.14⅝	.....
Cottonseed Oil, bbl.	6.70	6.05	6.74	6.70	6.70	6.70	.....
Cyanide Potash, lb.	.21	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.92	.92	.92	.92	.92	.92	.....
Lead, 100 lbs.	3.95	3.95	3.95	3.95	3.95	4.10	+.15
Linseed Oil	.60	.60	.60	.60	.62	.62	+.02
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans. crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa. crude	1.50	1.50	1.50	1.50	1.45	1.45	—.05
Rapeseed Oil, refined	.75	.75	.75	.75	.75	.75	.....
Rubber, Fine Up-River, Para	.58	.58	.58	.58	.58	.58	.....
Silk, raw, Ital.	..	3.90	..	..	3.90	3.85	—.05
Silk, raw, Japan	..	3.47½	..	..	3.50	3.45	—.02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lbs.	44.00	46.00	49.00	49.00	51.00	52.00	+ 8.00
Tire Scrap	.05	.05	.05	.05	.05	.05	.....

Automobile Securities Quotations

NEW YORK CITY, March 17—Changes in this week's securities quotations were considerably larger than last week's. There was a quick advance in the automobile stocks. An evidence of this is made when these stocks are compared with last week's and the low prices in January: Maxwell Motors first preferred, 74 today; 67 1-4 last week; and 43 1-4 in January; General Motors common, 97 today; 91 1-2 last week; and 82 in January; and General Motors preferred, 96 today; 94 last week; and 89 in January. The two other stocks of Maxwell Motors also made gains, the common being 3 points and the second preferred, 4 points. It is now being rumored that the Maxwell company will earn in the neighborhood of $3,000,000 for the fiscal year ending in July. If the company does earn $3,000,000 and the management decided to pay every cent of it in dividends, there will be less than $250,000 available for the common, which would figure at slightly less than 2 per cent. The first preferred, by the end of the fiscal year, will have accumulated 17 1-2 per cent., equal in money to approximately $2,150,000. The second preferred claiming 6 per cent., would require more than $600,000, leaving less than $250,000 for common General Motors established a new high record, having crossed par at 101 for March 15. A year ago this stock was listed at 37 3-8. Willys-Overland common gained 10 1-2 points.

	Bid	Asked	Bid	Asked	Ch'ges
Ajax-Grieb Rubber Co. com.	200	..	250	..	..
Ajax-Grieb Rubber Co. pfd.	99	102	100	..	..
Aluminum Castings pfd.	98	100	98	100	..
J. I. Case pfd.	..	..	75	80	—1
Chalmers Motor Co. com.	82	85	..	82	..
Chalmers Motor Co. pfd.	92½	94½	91½	93½	+1½
Electric Storage Battery Co.	..	..	48½	49½	..
Firestone Tire & Rubber Co. com.	288	292	400	405	+5
Firestone Tire & Rubber Co. pfd.	109	110	108	109½	..
Garford Co. pfd.	..	..	..	..	..
General Motors Co. com.	77	78	97	98	+5⅛
General Motors Co. pfd.	92	93	96	97	+2
B. F. Goodrich Co. com.	22½	23½	34	35	+3½
B. F. Goodrich Co. pfd.	87	90	98½	99½	+2½
Goodyear Tire & Rubber Co. com.	155	†165	192	194	+1
Goodyear Tire & Rubber Co. pfd.	92	†93½	104½	105½	+1½
Gray & Davis, Inc., pfd.	90	97	..	..	..
International Motor Co. com.	..	5	..	..	..
International Motor Co. pfd.	..	15	..	..	..
Kelly-Springfield Tire Co. com.	57	59	111	112	..
Kelly-Springfield Tire Co. 1st pfd.	130	140	83½	84½	+ ½
Kelly-Springfield Tire Co. 2d pfd.	..	..	118	125	+2
Maxwell Motor Co. com.	6	6½	30½	31½	+3
Maxwell Motor Co. 1st pfd.	29	30	74	75	+7½
Maxwell Motor Co. 2d pfd.	10¾	11¼	30½	31½	+4
Miller Rubber Co. com.	..	..	165	170	+5
Miller Rubber Co. pfd.	..	..	101	103	..
New Departure Mfg. Co. com.	..	..	125	126	+1
New Departure Mfg. Co. pfd.	..	..	105½	108	+ ½
Packard Motor Car Co. com.	101	116	..	97½	..
Packard Motor Car Co. pfd.	95	98	94	97	—1
Peerless Motor Car Co. com.	20	30	20	21	..
Peerless Motor Car Co. pfd.	..	80	..	55	..
Portage Rubber Co. com.	..	35	34	36	..
Portage Rubber Co. pfd.	..	90	85	95	..
*Reo Motor Truck Co.	8	8½	11½	12¼	+ ¼
*Reo Motor Car Co.	18¼	19	28¾	29¼	+1¾
Stewart-Warner Speed. Corp. com.	56	57	57	59	+7
Stewart-Warner Speed. Corp. pfd.	99	101	101½	..	..
Studebaker Corp. com.	24½	26	47	48	+ ⅛
Studebaker Corp. pfd.	80½	82¾	94	95	+1
Swinehart Tire & Rubber Co.	69½	70½	74½	76	+1½
Texas Company	..	..	131½	132½	—2½
U. S. Rubber Co. com.	61¾	62¼	55	56	—1¼
U. S. Rubber Co. pfd.	102¼	102¾	102	103	—1
Vacuum Oil Co.	..	..	180	183	..
White Co. pfd.	107	110	103	108	..
Willys-Overland Co. com.	63	68	109	110	+10½
Willys-Overland Co. pfd.	92	96	99	100	+2½

*Par value $10; all others $100 par value.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE.

ACTIVE STOCKS

	Bid	Asked	Bid	Asked	Net
	1914		1915		Ch'ges
Chalmers Motor Co. com.	..	83	..	82	—1
Chalmers Motor Co. pfd.	92	94	91¼	93½	+1½
General Motors Co. com.	76½	78	99	100½	+7½
General Motors Co. pfd.	92¼	93¾	96	97	+1
Maxwell Motor Co. com.	6½	7½	31	33	+4
Maxwell Motor Co. 1st pfd.	32	34	74½	76½	+7½
Maxwell Motor Co. 2d pfd.	11½	12½	31	32½	+5½
Packard Motor Car Co. com.	101	116	..	97½	..
Packard Motor Car Co. pfd.	95	98	93¾	97½	+ ¼
*Reo Motor Car Co.	19	20	28½	29½	+1
*Reo Motor Truck Co.	7½	8¼	11½	12⅛	+ ⅛
Studebaker Corp. com.	..	..	47	49	+1½
Studebaker Corp. pfd.	..	..	94	96	+1½
Continental Motor Co. com.	..	165	170	185	—5
Continental Motor Co. pfd.	..	75	80	85	..

INACTIVE STOCKS

*Atlas Drop Forge Co.	..	21	25	..	..
Ford Motor Co. of Canada	540	560	525	..	..
Kelsey Wheel Co.	190	200	195	..	..
*W. K. Pruden Co.	..	21	19	20½	+ ½
Regal Motor Car Co. pfd.	..	50	..	25	+3

*Par value $10; all others $100 par value.

N. Y. Motorists Protest on Bills

Delegates from State Associations Center Broad Attack on Hewitt Measure—Legal News

NEW YORK CITY, March 13—Characterizing the present motor vehicle law as unconstitutional, Charles Thaddeus Terry, together with delegates from New York and Brooklyn dealers' associations and from all of the larger state automobile bodies, appeared before the Joint Committee on Internal Affairs at Albany on Wednesday last and entered formal protest against the score or more of bills which are at present pending in the legislature.

The measure upon which fire was centered was the Hewitt bill which, in addition to doubling the fees for the registration of pleasure cars also places a heavy burden on the users of commercial vehicles. In assailing the Hewitt bill, Terry pointed out that there is nothing in the present law which provides for the collection of fees greater than those actually necessary to offset the expense of the registration. In New York State, he said, this amounts to about $2. Hence, he added, the levying of higher fees constitutes a violation of the law which reaches the proportions of confiscation. It is, he added, class legislation, and therefore contrary to all principles of taxation.

Melvin T. Bender, representing the New York State Motor Federation, reiterated what Terry said and added that with all law left out of the question, the Hewitt measure is unfair in that it does not classify all vehicles and tax them in proportion to the amount of damage they do to the roads. Such a measure, he added, would have the support of both users and dealers.

With regard to the other bills, Terry pointed out the fallacy of expecting an examination, such as would be required by one of them, to result in a lessening of accidents. He pointed out that such examinations as are made are little more than farces in any case and added that allowing for 180,000 cars in use, and perhaps four members of each family driving, the necessary examination would require something like 4,000,000 hours, allowing 3 hours each for the written and driving tests. The result, he added, would be obtained in about 1917 or 1918. As for the bill which would require every motorist to supply a bond of $5,000, he could see no benefit in this measure except to the surety companies.

Another measure which was protested was Senate bill No. 1041, which would prohibit the use of non-skid devices of any type, whether chains or merely the usual corrugated rubber tread. Although it was pointed out that it was not the intent of the measure that it apply to passenger vehicles, the bill distinctly includes these. It is understood that the verbiage will be altered to make this provision apply only to heavy traction engines.

Tax on H.P. and Weight in Michigan

LANSING, MICH., March 10—The automobile horsepower and weight tax bill presented by Representative Newel Smith was passed in the House today and will now go to the Senate, where, it is claimed, it will also be passed. The new bill provides a tax of 25 cents per horsepower plus 25 cents for each 100 pounds in weight, for gasoline passenger cars; $1 per horsepower and 25 cents per 100 pounds for electric passenger vehicles; 15 cents per horsepower and 15 cents for each 100 pounds in weight for gasoline and steam trucks; 50 cents per horsepower and 25 cents per each 100 pounds of weight for electric trucks. The tax for motorcycles is 25 cents per horsepower and 25 cents per 100 pounds of weight.

It was provided that 75 per cent of the proceeds will go to the state highway department and 25 per cent to the counties from which the funds came, to be used on highway improvements in the counties.

Approximately $12 will be the average tax per car and truck and on this basis at least $330,000 will be paid by Detroit motor owners, it being estimated that by the end of the year 27,500 passenger cars and trucks will be registered in the city.

Barber Cage-Valve Suit Settled

NEW YORK CITY, March 12—The patent suit which William Barber, a Brooklyn, N. Y., inventor, brought against G. B. Foster, Yonkers, N. Y., Buick dealer, for alleged infringement of patent No. 781,802, issued February 7, 1905, has been settled and the right to use the patent granted the Buick Motor Co. It is understood that several other companies as well have obtained the right to use the construction.

The particular point covered by Barber's patent is the removability of cage-valve construction, the claims stating: "In an explosion motor the combination with an explosion chamber having an inlet orifice provided at one side with means for connecting same with an explosive vapor supply pipe, a normally closed inlet valve located in such inlet orifice, and a removable plug secured in the bushing so as to close the outer end thereof and secure the valve in position in such a manner that the valve may be removed without disturbance of the bushing upon removal of the plug."

Cadillac Wins Wheel Suit Appeal

NEW YORK CITY, March 16—That a manufacturer need not test car materials, if purchased from reputable concerns, except to make a reasonable examination, was the substance of a decision in the United States Circuit Court of Appeals for the second circuit last week. Judge Coxe, however, wrote a dissenting opinion. The case was E. Wells Johnson, of Amsterdam, N. Y., against the Cadillac Motor Car Co., of Detroit, Mich., appellant, and has been before the courts for 6 years.

Judge Ward wrote the opinion of two of the three judges who decided the case in favor of the Cadillac company, reversing the trial court's judgment. The law that guided them was that one who manufactures articles dangerous only if defectively made or installed is not liable to third parties except in the case where wilful injury or fraud is shown. The liability of manufacturers of inherently dangerous commodities, such as powder and poison, was considered, although it was agreed that the automobile is not an inherently dangerous device. A manufacturer is not liable in tort to third persons, even in the case of inherently dangerous articles, when he can prove that he has exercised reasonable care with reference to the manufacture.

The testimony showed that the car of the plaintiff was travelling at the rate of 12 to 15 miles an hour when the wheel collapsed, overturning the car and injuring Johnson. The car had been bought in March, 1909, and was a Cadillac Model 30. A spoke of the wheel, made by the Schwarz Wheel Co., was held to be "dead and dozy," instead of sound second growth hickory.

The Cadillac company contended that it was physically impossible to test completed wheels because the only test would be to bore into a spoke, destroying that particular spoke.

COLUMBUS, O., March 13—The Ohio House of Representatives defeated the bill passed by the Senate, compelling all vehicles at night time to carry lights visible from in front and in the rear. The farmer vote in the House of Representatives opposed the measure on the ground that it was unfair to farming communities. They first tried to amend the bill, excepting farmers, but failing to make it appear constitutional, voted for its defeat.

$5,000,000 Capital for New Lozier

DETROIT, MICH., March 13—Before the end of this month final reorganization of the Lozier Motor Co. will be effected and a $5,000,000 concern organized. This is the plan of the purchasers of the assets of the old company, and for that purpose there will probably be issued $3,000,000 common stock and $2,000,000 preferred stock.

There have been many conferences between the Lozier purchasers and bankers and capitalists in New York, Detroit and Chicago and the Detroit Trust Co., trustee. Provided certain agreements made with the latter concern are fulfilled it may be a matter of only a week or 10 days before the announcement of the final organization is made.

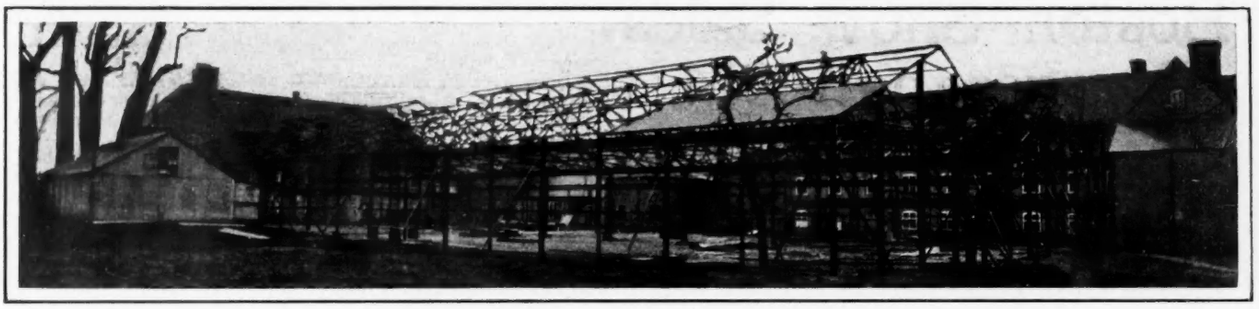
Speaking about the matter, General Manager Samuel Frank stated that the various interests who purchased the bankrupt concern have been greatly encouraged to go ahead in their reorganization plans owing to the favorable reports received from many dealers throughout the country.

The Associated Lozier Purchasers, which was organized and incorporated with a capital stock of $24,000 as a temporary working company, will be absorbed by the new concern.

Third Dividend of 10% for R-C-H Creditors

DETROIT, MICH., March 15—A third dividend of 10 per cent. is being mailed today by the Security Trust Co., trustee for the R-C-H Corp., to those creditors whose claims arose after October 25, 1912, including deposits of dealers and claims for materials made up or partly made up but not delivered. These creditors will receive, it is estimated by the trustee, between 50 and 55 per cent. of their claims and of this 40 per cent. has been paid them, inclusive of today's dividend.

In its report to the various creditors the trustee explains that he



DETROIT, MICH, March 12.—A large contract has been closed by the Continental Motor Mfg. Co. with W. R. M. Morris, Ltd., of Oxford, England, calling for the delivery of 5,000 Continental motors during the coming year. The illustration shows additions now under construction to the Morris plant. This is the first English factory to attempt the manufacture of small cars on a big scale. Many of the leading American products have been adopted by this pioneer company, whose representatives have made several recent visits to this country, and have been thoroughly imbued with the economies of American manufacture

has paid $208,454.13 of secured claims, including a real estate mortgage of $154,970.70, balance due on land contracts, $32,186.66, delinquent taxes of $7,402.44; vendor's liens on machinery $9,467, and other smaller items.

After the payment of secured claims, liens and expenses the trustee estimates that approximately $210,000 will be available for distribution as detailed above.

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To Reopen Nyberg Factory—New Car

ANDERSON, IND., March 13—Arrangements have been completed for reopening the plant of the Nyberg Automobile Co. at Anderson, Ind. The plant has been closed several months, but has now been overhauled and ample capital has been secured. It is reported a light, popular-priced car will be the product.

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Walpole Plant Sold for $780,000

BOSTON, MASS., March 12—With the conditional sale on March 10 of the property and assets of the Walpole Tire & Rubber Co., the affairs of that company appear to be straightening out. Federal Judge Dodge must approve the same, and his decision will not be known until March 22. The property was auctioned at a receiver's sale in Walpole.

There were three bidders, a committee of New York creditors, represented by Morris & Plante; a stockholders' protective committee, and Mr. Kendall, of Walpole, a manufacturer. The bidding started at $600,000 and the property finally went to the New York creditors on a bid of $780,000. The stockholders' highest bid was $775,000.

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COLUMBUS, O., March 13—Upon the application of H. C. Park, trustee for a bond issue on the real estate, Judge Kinkead has appointed him receiver for the Dunlap Mfg. Co., manufacturer of automobile parts.

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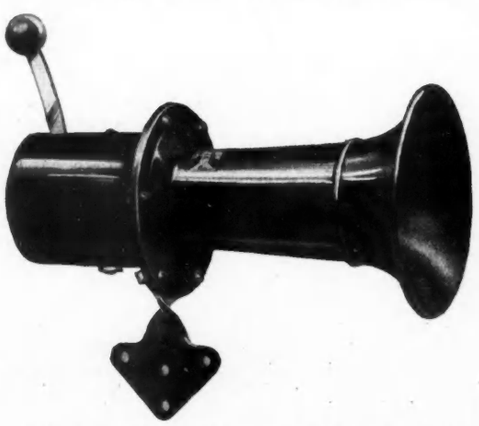
7 Per Cent. Dividend for Abbott Creditors

DETROIT, MICH., March 15—This month the creditors of the former Abbott Motor Co. will receive a 7 per cent. dividend, instead of a 3 per cent. dividend which has been paid them during the preceding 4 months. This will make 19 per cent. thus far. These dividends are available through the sale of Abbott parts, which is taken care of by the Consolidated Car Co., successor to the old Abbott concern.



Hand-operated Sparton horn which sells for $4

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SAN FRANCISCO, CAL., March 5—Announcement has been made by C. B. Lewis, of the Lewis Motor Truck Co., Oakland, Cal., that the business of that concern will be discontinued. Mr. Lewis has severed his connection with the concern and opened an office as consulting engineer, Room 406 Board of Trade Bldg., San Francisco, from which office he will attend to repair work and replacement of parts for owners of Lewis vehicles.

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N. A. C. C. Trying to Standardize Treads

NEW YORK CITY, March 13—In response to the insistent demand from southern dealers as well as from the manufacturers generally, an effort is now being made by the National Automobile Chamber of Commerce to bring about the standardization of vehicle tracks in this country, which of course will mean lower manufacturing costs and ultimately lower list prices to buyers of cars.

From the manufacturers' standpoint, the making of wide tracks has been a source of trouble and expense, because it necessitated the carrying of large stocks of extra parts, the making of special axles, special fenders, and in some cases, steering gears. Invariably he guessed wrong as to the number of cars to be used in the south, and cars also always came through too late for the southern selling season, besides being a disturbing factor in factory production.

On the other hand, there are some places in the south like southern Florida and southern Georgia where there is still a demand for the 60-inch tread, and this demand is being supplied, although the dealers state that another year or so should see such improvement in road conditions that the standard tread will be in demand.

Working in conjunction with the committee on standard tread, consisting of Messrs. C. W. Nash, General Motors Co., Carl Pelton, Maxwell, J. Walter Drake, Hupmobile, E. R. Benson, Studebaker, and C. S. Jameson, Overland, and the engineers in the Society of Automobile Engineers, Alfred Reeves, general manager of the N. A. C. C. is now arranging to have a conference with the representatives of the National Implement and Vehicle Association and the Carriage Builders National Association, most of whom are also producers of sleighs.

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Hand-Operated Sparton Horn for $4

JACKSON, MICH., March 15—Without in the least altering the construction of its model F hand-operated Sparton horn, the Sparks-Withington Co., Jackson, Mich., has reduced its price from $4.25 to $4. At the same time, the horn hereafter will be furnished in either all black satin finish or in black and nickel finish. The horn is supplied with a rigid supporting arm ready to be attached and can be operated by the hand, elbow, foot or knee. A screwdriver is all that is required to make the installation.

"Quantity production is the reason for the reduced price," says Wm. Sparks. "We have hammered costs down to the last notch. Our business is 57 per cent. ahead of this time last year."

Boston Show Sales Larger than 1914

$1,000 to $2,000 Cars Total $15,000 to $50,000 — Prospects Plentiful — Large Accessory Business

BOSTON, MASS., March 15—Business done at the Boston show was in accord with the prosperous industrial conditions in New England. Many sales were reported of both cars and accessories, the $1,000 to $2,000 cars selling from twelve to twenty-four, while the total sales in this class were about $15,000 to $50,000. These figures are better than those for 1914, both in individual cases and in the total.

In the higher-priced cars, such as Packard, Pierce-Arrow, and the two foreign cars, Renault and Rolls-Royce, the sales were of course fewer, being as low as two and three in some cases, but the value total is higher and many prospects were secured. In the Cadillac exhibit one salesman said he had—up to Saturday afternoon—secured 250 prospects of his own, not counting those secured by the other salesmen.

In the case of cars which are new in the field or are new in this territory considerable dealer business is transacted. Among the cars new to New England were the Enger, Lewis, Allen and Dodge Bros. All reported good business.

In the accessory division there was more retail business than ordinarily develops at a show which has a national ranking. One tire tool exhibitor shipped 1,000 tools to his exhibit and disposed of the last one early Saturday evening—at $1 each. J. O. Caldwell said Friday that this show brought more business than his accessory house ever had at any preceding show. And most of the sales were of small amounts, from $1 to $5.

The attendance was big; the press agent said 300,000 and the figure will probably be somewhere between that and 200,000; Friday night the show building was so congested that it was necessary to close the doors and let people out before more could be admitted; the street was packed in front of the building.

The big social event of the week was the Auto Round-Up Thursday evening at the Copley-Plaza, where 600 tradesmen sat down at 11 o'clock in the evening to a beefsteak dinner and cabaret.

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BOSTON, MASS., March 13—The automobile dealers of New England at a meeting held here last Thursday, took steps toward the formation of an association of the dealers of the six New England states. The meeting, which was called by the Boston Automobile Dealers' Assn., by resolution voted to name a committee consisting of the representatives of city, county and state associations to meet later in Boston for the consideration of further plans.

At the meeting were association delegates who represented nearly 600 dealers; thirteen separate organizations appeared through members and the gathering was unanimous in its approval of the plan to bind the trade of the New England states into an offensive and defensive body. The states are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

One of the principal objects of the unifying of the New England dealers is the establishment of a defense against legislation which is aimed promiscuously at the trade.

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300 Cars Sold at Indianapolis Opening

INDIANAPOLIS, IND., March 13—If any vindication were required, the spring opening as a producer of business was vindicated last week at the annual spring opening of local dealers. The sales went beyond all expectations, ideal weather throughout the week contributing much to the successful results obtained.

There were thousands of visitors from all parts of the state, and contracts for approximately 300 cars were closed during the week. State distributors also closed many new agencies and altogether the members of the Indianapolis Automobile Trade Assn., under whose auspices the opening was held, were very well satisfied.

The dealers are now looking forward to the fall show, which will be held at the Indiana State Fair in September. This will be staged in a tent, as it was last fall. Indianapolis is practically converted to the idea of two shows a year as a stimulant to business.

The opening gave dealers an excellent opportunity, also, to dispose of used cars that have accumulated since last fall. Used cars were advertised extensively and prices were placed on them to make them move quickly. As a result few of the dealers have any used cars on hand.

There were the usual dinners to agents during the week. Almost every concern that distributes for the state, entertained its state agents in some way or another. The Buick branch gave a dinner to its agents at the Claypool Hotel, Thursday night.

The Hoosier Motor Club gave a luncheon and vaudeville performance at the Claypool Hotel, Wednesday night, which was well attended. The entertainment was furnished largely by performers from vaudeville theatres.

The only other united event was the visit to the new Ford assembling plant, Tuesday afternoon. There was a parade 2 miles long. The Ford company alone had 350 cars in line and most of the city dealers had cars in line.

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Lehigh Valley Show Sells 133 Cars

SOUTH BETHLEHEM, PA., March 13—Dealers in the Lehigh Valley region who were represented at the recent First Annual Lehigh Valley Automobile Show in the Colosseum here are today congratulating themselves that their timidity when the suggestion of exhibiting was first broached was overcome, for more than $200,000 was divided among them directly attributable to the exhibition.

There were 133 cars sold on the floor during Show Week. Kieffer & Steele, of Easton, carried off the honors and also the silver cup donated by the Lehigh Valley Show management to the dealer making the largest number of sales. They handle the Chevrolet and the Haynes, and sold 15 cars. Charles Snyder, of Allentown, the runner-up, sold 11 Saxons. Sales of 107 more cars were distributed among about 50 dealers.

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Truck Exhibit at Exposition Opens April 1

SAN FRANCISCO, CAL., March 12—The motor truck manufacturers will have a building erected exclusively for their exhibits at the Panama-Pacific International Exposition. It will be ready for occupancy on March 20 and will be opened on April 1, continuing through the exposition period.

The building is being erected east of Machinery Hall on a five-sided plot of ground and will be one story in height and will have a total floor area of 71,000 square feet. The space which will be available for exhibits is 54,650 square feet.

A large testing laboratory will be installed in connection with the truck exhibits. A series of exhaustive tests covering every portion of manufacturing processes, the testing of the various steels and alloys in chassis and motor construction and the standardization of the parts which enter into the makeup of the modern machine, will be carried out.

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NEW YORK CITY, March 16—It has been decided that the motor truck convention, which, as announced in THE AUTOMOBILE for March 11, will be held May 5 and 6 in Detroit by the National Automobile Chamber of Commerce, will be held in the banquet hall of the new Statler Hotel.

Members of the Commercial Vehicle Committee of the N. A. C. C. are at work on the program. The list of papers to be prepared has not yet been decided upon, but it will embrace subjects of uppermost interest to manufacturers. such as service to be rendered to users by the makers and dealers, standardization of capacity rating, shows and demonstrations, and so forth.

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Developments in the Jitney Field

PHILADELPHIA, PA., March 10—City Solicitor Michael J. Ryan yesterday issued an announcement advocating the establishment of motor bus lines all over the city as a solution of the transportation problem, at the same time declaring that no legal obstacles barred the way. With the exception of the ordinances and regulations governing horse cabs and taxicabs, there is nothing to prevent independent jitney bus owners working over regular routes all over the city, and that is just what is about to happen. Fortified with the city solicitor's opinion on the subject, it is expected that another week will see the city honeycombed with the motor bus. Jitney cars are already beginning operation.

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ROCK ISLAND, ILL., March 15—The first union of jitney bus drivers has been organized at Rock Island, and includes the twenty-two drivers in charge of cars running between Rock Island, Moline and Davenport. The union will come under the jurisdiction of the International Teamsters, Chauffeurs, and Stablemen's union. The following officers were

elected: President, Chester Staup; recording secretary, William Dickman; financial secretary, L. S. Massick, and treasurer, Wlliam Gable. The buses are all reporting a thriving patronage and are cutting heavily into the street railway receipts.

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ALBANY, N. Y., March 12—A charter has been granted to the White Star Jitney Line of Rochester, with a capital of $50,000. The incorporators are Wm. Cross, W. J. Dever, G. V. Kondoff, all of Rochester.

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HARRISBURG, PA., March 13—Starting on April 1, the Jitney Bus Co., of Harrisburg, will begin the operation of fifty automobiles on the streets of Harrisburg to compete with the traction interests. The Jitney bus craze is spreading throughout interior Pennsylvania and companies have recently been organized in Williamsport, Altoona, York, Lancaster, and other cities to carry on the rapid automobile transit business.

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ST. LOUIS, MO., March 16—After 2 weeks of operation without any specific regulations the jitney buses in St. Louis will have to follow a specially prepared set of rules of traffic laid down by the city this week. No longer will fifteen persons be squeezed into a five-passenger car, that is if one of the new rules is enforced. The new set of regulations in brief follows:

Cars must be examined every two weeks to ascertain whether they are safe for the carriage of passengers.

All chauffeurs must be licensed by the state and each must carry his badge certifying as much.

To prevent overloading standard touring cars and limousines shall carry not more than two persons over the number named by the manufacturer as its capacity. Other cars shall carry no more persons than can be seated comfortably.

No person shall be permitted in any car except in the body thereof.

No car shall receive or discharge passengers except at sidewalk curbs and then only when at a standstill.

No car shall pass another for the purpose of securing a passenger.

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NEW YORK CITY, March 15—Walter C. Allen has been elected president of the Yale & Towne Co., succeeding H. R. Towne, who was made chairman of the board.

The stockholders of the company, upon the recommendation of the directors, have authorized the issue of $500,000 additional capital stock. The present stock is $3,000,000. Substantially all of the stockholders have waived their right of subscription thereto in order thereby to place the stock so surrendered in the hands of the directors, and thus enabling the latter to arrange for its acquisition in proper proportions and on equitable terms, at not less than par, by officers and employees of the company upon whom will rest the responsibility of the further development of the business.

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TACOMA, WASH., March 12—George D. Dunn, secretary of the Tacoma Speedway Association, has signed up Eddie Pullen, Guy Ruckstell, Earl Cooper, Dave Lewis, Bob Burman and Jim Parsons for the Tacoma speedway races this year, and Oldfield. D. Resta and Ralph de Palma will shortly sign contracts. New cars which will be seen by Northwest fans this year are the Buggatti, which will be driven by the French driver, J. B. Marquis.

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Whelan Heads Detroit Speedway

DETROIT, MICH., March 13—Officers and directors have been chosen for the Detroit Motor Speedway which has succeeded the Detroit Speedway Club. Only a few of the officials from the old organization are with the new one. All are well known in business and private circles of the city.

The President is John B. Whelan, United States collector of customs in this district. S. D. Maddux, contractor of Indianapolis, Ind., is vice-president; Albert Hardenstine is treasurer and R. R. Swart is secretary.

The board of directors includes C. C. Starkweather, president of the Detroit Automobile Dealers Assn.; Philip Breitmeyer, vice-president of the German-American Bank; Otto Mich, contractor and builder; Ralph M. Tate, lawyer; George Fullwell, proprietor of the Normandie and Oriental hotels; James Q. Goudie, general manager of the Pennsylvania Rubber Co., and J. B. Haggerty.

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$20,000 Prize for Race in Omaha

OMAHA, NEB., March 13—A purse of $20,000 is being raised in this city for the 300-mile race to be held here July 5. It is expected that the leading drivers in the Grand Prix and Vanderbilt cup races will participate. It is stated that Ralph De Palma and Barney Oldfield have agreed to come to this city.

Oldfield Winner in Venice Race

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Covers 300 Miles in Maxwell at 68.8 m.p.h.—Carlson, Maxwell, Second and Ruckstall, Mercer, Third

VENICE, CAL., RACE COURSE, March 17—*Special Telegram*—Barney Oldfield, in a Maxwell, today won the first annual Venice grand prix, covering the 300-mile course in 4:24:9 2-5, or 68.8 miles per hour. His team-mate, Billy Carlson, sent his Maxwell over the line for second place in 4:24:43 2-5, while Ruckstall's Mercer took third money in 4:27:27 1-5. Dave Lewis's Stutz had practically won the race when, on the next to the last lap, engine trouble put it out of the running. Fourth place went to Marquis, in the Bugatti, his time being 4:31:39, and Hearne's Case, which ran a consistent race throughout, was fifth in 4:44:51.

With the thermometer registering 85 degrees in the shade, 75,000 spectators watched the race, which was filled with unexpected thrills.

The start of the race was delayed 17 minutes, Chairman Kennerdell, of the A. A. A., demanding a certified check for the $8,000 prize money, which the race treasurer had at a local bank. On the starting line Nikrent and Hughes were ruled out by Mr. Kennerdell over Referee Weise. Pullen, in the Mercer, stripped his gears at the tape and was unable to get away.

From the first to the twentieth lap, Rickenbacher, in a Maxwell, was in the lead with Ruckstall's Mercer second and Klein's Puento Pronto third. At the end of the twentieth lap Rickenbacher's lead was two laps.

On the ninth lap the scoreboard fell with twenty men. Two were injured and taken to the hospital. Another unexpected diversion occurred when Caleb Bragg drove Glen Martin's aeroplane down from Los Angeles and circled the course three times, the passengers being Martin and Engineer Kliesrath of the Bosch company.

On the fifty-fifth lap Ruckstall was leading with Hearne's Case second, Lewis's Stutz third and Oldfield fourth, the average speed for the lap being 71 miles per hour. On this lap Marquis, in the Bugatti, hit a spectator and mangled his limbs.

By lap 70 the order was Lewis, Hearne, Carlson and Oldfield, the speed being 71 miles per hour.

On the eightieth lap the drivers maintained the same positions, but the average speed went up to 71.5 miles an hour. Chairman Kennerdell appointed Fred Wagner emergency representative of the A. A. A.

Lap 90 saw the drivers still circling the track in the same order, but the speed had jumped to 72 miles per hour. The closing laps of the race saw several changes. Oldfield working his way to first from fourth place and Carlson pushing past the disabled Lewis and Hearne to finish second.

The Napier, entered and driven by Orville Jonas, was wrecked last night in a practice run. The opening practice on the Venice course on March 11 was also featured by an accident. Jonas, entrant and driver of the wrecked Napier, went into one of the boarded banked turns at high speed and climbed out over the outside. Lamkin, who was riding with Jonas, was severely injured. Newhouse, driving the DeLage, made the fastest time on the course, completing the circuit at an average of 75 m.p.h. Marquis, on the German Bugatti, made a lap at 72 m.p.h.

Cooper withdrew from the race on account of tonsilitis, Harry Grant taking his place. Louis Nikrent at the last moment decided to enter the Californian, which is a special Mercer.

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A. C. S. C. Severs Connection with A. A. A.

LOS ANGELES, CAL., March 16—*Special Telegram*—Don Lee resigned as referee of the Venice race when the directors of the Automobile Club of Southern California passed resolutions severing all connections with the American Automobile Assn. on account of the action of Chairman Richard Kennerdell in removing the local contest committee of ten automobile club members who formerly served as official representatives of the A. A. A. John Weise today assumed the position of referee. Chairman Kennerdell, who is in complete charge of the race, requires a statement from Mayor Garety of Venice, assuming all responsibility for the race on account of the dangerous character of the course.

Factory Miscellany

STEEL Products Completes Addition—The Electric Welding Co., Cleveland, O., which recently changed its name to the Steel Products Co., and which increased its capital from $250,000 to $1,000,000, has just completed an addition to its main plant. Contracts have been given for three additional units to be 125 by 45 feet each. The officers of the company are: C. E. Thompson, president and general manager; W. D. Bartlett, vice-president and superintendent; J. A. Krider, secretary and sales manager, and G. H. Brown, treasurer. The chief business of the Steel Products Co. is the manufacture of gas engine valve stems or poppet valves, also spring shackle bolts. A branch office has been opened in Detroit, Mich., at 1515 Ford Building, which is in charge of Frank DeWitt, who has been the Michigan representative for some time.

Victor Rubber to Enlarge—The Victor Rubber Co., Springfield, O., will erect an addition to its plant.

Amplex to Resume—The Amplex Auto Works, Mishawaka, Ind., sold by a receiver to Adolph Kamm, Sr., will resume operations.

Falls Rubber to Build—The Falls Rubber Co., Cuyahoga Falls, O., has purchased a site at Main and Broad streets, upon which will be erected a new factory.

Regal Increases Berlin Plant—The Regal Automobile Co., Detroit, will make an addition to its factory at Berlin, Ont., and will require machinery. Mr. Nyberg is branch manager.

Accessory Plant for Ont.—The Rolls-Royce, Ltd., will establish a factory in Ontario for the manufacture of automobile accessories. James C. Royce, Davenport Road, Toronto, Ont., is representative.

To Move Plant—C. E. Miller and A. C. George, of Lima, O., and F. M. McGraw, of Auburn, Ind., are preparing to move a factory now turning out light delivery wagons, located at Auburn, to Lima. The plant will be located on West Spring street.

Red Arrow to Build—The Red Arrow Automobile Co., Orange, Mass., has awarded the contract for a fireproof factory which will be used for the manufacture of automobiles. The company states that it will be in the market for air compressor, pump, boiler, tank and machinery, details of the requirements for which are not stated.

U. S. Wheel to Erect Plant—The United States Wheel & Tire Co., Rockton, Wis., will erect a plant, 100 by 110 feet, 2½ stories, of brick, steel and concrete construction, to be equipped for the manufacture of elastic wheels for automobiles and motor trucks. The company is capitalized at $300,000. E. S. Gleasman is president.

Canadian Truck Factories Busy—Maisonneuve motor trucks are now being produced by the Oxford Motor Cars & Foundries, Ltd., of Montreal, Que. The plant is being operated day and night. A. J. Lavoie has recently been appointed manager. At Walkerville, Ont., the Dominion Motors, Ltd., is manufacturing the Dominion motor truck.

West Bend Aluminum Busy—The West Bend Aluminum Co., West Bend, Wis., which erected a new factory during last year, is again becoming crowded for room and contemplates the erection of additions during 1915. The company has recently made a voluntary increase of 10 to 20 cents a day in the pay of employees, the increase being graduated by the term of service.

Maxwell Shipments Increase 131 Per Cent.—During November, December and January the Maxwell Motor Co., Detroit, Mich., shipped 6,829 cars, as against 2,950 last season, an increase of 131 per cent.; in February, 3,691 cars, against 794 in February, 1914, an increase of 377 per cent. In January, 1915, the company had on its payroll 6,633 men, against 3,788 in January, 1914, an increase of 75 per cent.

Elbert Plant at Sunnyvale—Negotiations were completed last week by the Elbert Motor Car Co. whereby that concern comes into possession of a completely equipped factory at Sunnyvale, Cal., 38 miles south of San Francisco, where the Seattle-designed Elbert cars will be built. The plant consists of 20 acres of land, on which are six buildings giving a total floor space of 40,000 square feet. The assembling plant will be maintained for supplying the Northwest trade in Seattle.

Bergstrom Plant at Rockford—Bergstrom Bros., Rockford, Ill., manufacturers of the Bergie national spark plug, have organized a stock company and received articles of incorporation this week, capital stock being fixed at $5,000. The incorporators are Andrew, Adolph and Arthur Bergstrom, all of Rockford. The company has been operating a factory at Belvidere, but recently decided to remove to Rockford, Ill., owing to the necessity for extending the field and where more advantageous shipping facilities could be secured.

J. I. C. Warehouse in Madison—The J. I. Case T. M. Co., Racine, Wis., is preparing to erect a large warehouse and office building for its factory branch in Madison, Wis. The building will be 100 by 140 feet in size, two stories high, of solid brick construction and cost about $35,000. Because of the increasing importance of its motor car business the company will make ample provision for garage and service station in the new building. The Madison branch was one of the first to be established by the Racine concern.

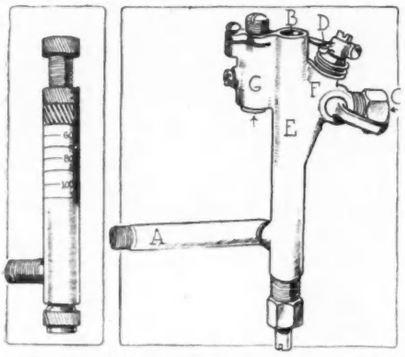
Fire Damages Detroit Plant—Fire destroyed the greater part of the three-story plant of the Detroit Foundry Co., at Fordyce and Marston avenues and Morrow street, Detroit, Mich., on March 12. The total loss to the foundry concern is estimated at about $75,000 and that of the Farmer Mfg. Co., which occupied the third floor of the building, at $25,000. The foundry company's business will not be very strongly affected, according to officials of the company, as the production facilities of the second plant of the company, on Hastings street, will be at once increased to take care of the business for the two plants. The rebuilding of the burned structure will be started as soon as possible. Officials of the Farmer company, which made the Farmer automobile motors, could not be reached to find out about the future plans of that concern.

The Automobile Calendar

Mar. 13-20	Harrisburg, Pa., Show Arena. Harrisburg Dealers Association.
Mar. 17-20	Elgin, Ill., Show, W. H. Tidmarsh, Mgr.
Mar. 22-27	Bangor, Me., Show, Bangor Auditorium.
Mar. 22-27	Newark, O., Show, Arcade Bldg.
Mar. 24-27	Oil City, Pa., Show, New Armory.
Mar. 25-27	Mason City, Ia., Show, New Armory.
Mar. 30-April 2	Johnstown, Pa., Show, The Auditorium.
April	Calumet, Mich., Show, Coliseum.
April 3	Paterson, N. J., Show, Auditorium, R. A. Mitchell.
April 5-10	DuBois, Pa., Show, Moose Hall.
April 16	Manchester, Eng., Show, Ice Palace, North of England Motor Shows, Ltd.
April 20-22	Oklahoma City, Okla. Road Race, S. W. Auto Racing Assn.
May 17-18	Boston, Mass., A. A. A. Annual Meeting.
May 27	Chicago, Ill., Sociability Run of Chicago Motor Club to South Bend, Ind. H. H. Robinson.
May 29	Indianapolis, Ind., 500-Mile Race. Indianapolis Motor Speedway.
June 9	Galesburg, Ill., 200-Mile Race, Galesburg District Fair Assn.
June 19	Chicago, Ill., 500-Mile Race, Chicago Speedway.
July 3	Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn.
July 4-5	Tacoma, Wash., Road Race.
July 5	Omaha, Neb., Speedway Races, Omaha Motor Speedway.
Aug.	Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3	San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21	Elgin, Ill., Road Race.
Sept.	Indianapolis, Ind., Fall Show, Indiana State Fair.
Sept. 20-25	San Francisco, Cal., International Engineering Congress.
Oct. 6-16	New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.

ACCESSORIES

LOW-SPEED Carbureter—From the modern automatic carbureter it is possible to obtain easy starting and very slow idling speed, but with older instruments it is often difficult or impossible to make adjustments to suit the full range. Actually in effect the modern carbureter when the throttle

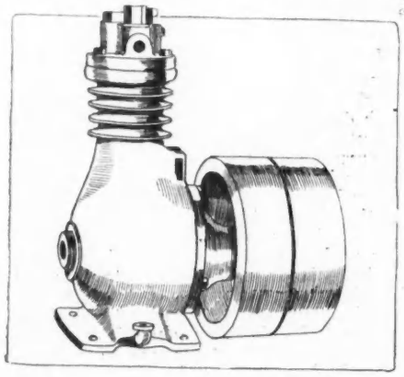


Left—Regulating pressure gauge. Right—Stokes low speed carbureter

is closed for idling becomes a smaller size, and in many cases the supplementary jet brought into action is the equivalent of a miniature carbureter which is used for idling only and goes out of action as soon as the throttle is opened.

The device here described is a miniature carbureter complete in every particular, except that it has no float chamber, and it can be attached to any car whatever. It is necessary to drill and tap a hole in the side of the float chamber of the old carbureter to suit the threaded end of the pipe A, and from B a short length of small-bore copper tube is connected to any convenient point in the intake manifold. From C another small pipe is taken to either the cowl board or the front of the car, according to whether there is a self-starter or not, and a wire ending in a thumb ring is led alongside this pipe from the lever D.

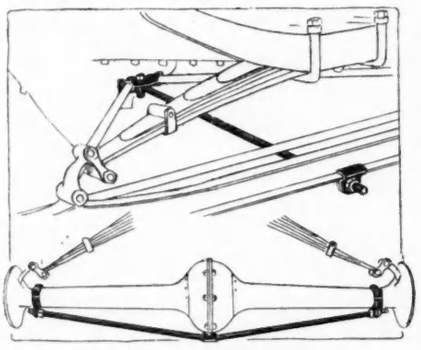
Gasoline entering through the pipe A flows upward through the main part of the device, and at E there is a constriction which makes a kind of jet. Below E



Compressor for private garages

a piece of hexagonal brass an inch or two in length and with a rounded upper end lies, so that if the suction becomes very strong this is lifted and partially closes the jet. In the branch passage F there is a second tiny jet controlled as to size by a pin which can be regulated by the lever D, while inside the part G is a small air valve with a spring adjustable as to tension by the screw seen above it. Air also enters through the pipe C and flows across the little jet F.

Usually the end of pipe C is fitted with a tiny muffler to prevent any hissing noise from the entering air, and the tap shown is not intended to be used once it has been set to suit the particular motor in question. When the motor is cranked gasoline is drawn in from both jets, and if the speed rises the main jet goes out of action automatically. The convergence of the air streams causes great turbulence and reduces the fuel to a condition



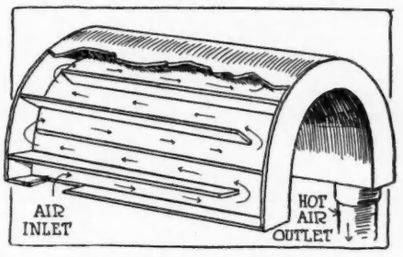
Axle attachments for Fords

of extreme subdivision—so much so, in fact, that it is claimed to be possible to start a motor on kerosene. Since it is very simple and most inexpensive the invention should find a great many supporters, and there is no question but that it enables any motor to be run at very low speed indeed. A point in connection with it that is particularly interesting is that it will allow adjustment to suit a motor in which wear on the valve stems permits a continuous air leak, this being difficult of accomplishment even with the best of carbureters.—Stokes Carbureter Co., Detroit, Mich.

Air-Pressure Regulator—There is nothing new in the pocket tire gauge to show the air pressure accurately, but this apparatus works in a different way. It is set by hand to the pressure desired and then inserted in the pipe line by attaching it to the valve and then screwing the pump or air line to the side of the gauge. As soon as the desired pressure is reached the gauge will blow off with a pop, and any further supply will simply escape to the atmosphere.—American Sanitary Lock Co., Indianapolis, Ind.

Small Air Compressor—A small compressor for use in a private garage is a luxury that most car owners would like to possess if price was not a consideration, and the little Gardner "Midget" pump has been produced with the idea that it will appeal to this class of user. The makers are producers of air pumps in a variety of sizes and patterns, so they have plenty of experience in the manufacture of this kind of machine. The "Midget" is good for a steady output at 125 pounds per square inch, so it is well capable of taking care of the largest automobile tires. It can, of course, be driven from any convenient source of power.—Gardner Governor Co., Quincy, Ill.

Ford Car Axle Strengthening—Two novelties for attachment to Ford axles have for their purpose the strengthening of the rear axle against road shocks and the steadying of the front axle against twisting in a springy way when traveling over rough ground. It is not supposed

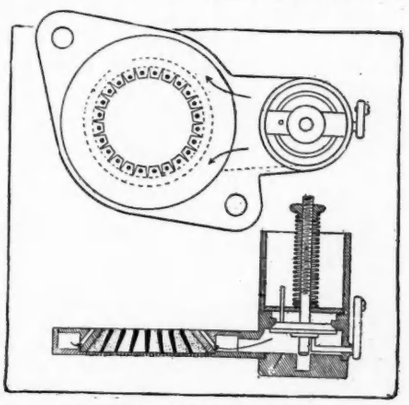


Exhaust muff for carbureter air heater

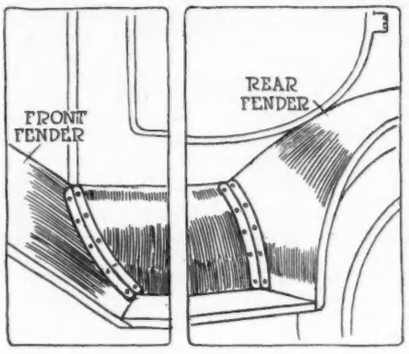
that the rear axles of newer model Fords are deficient in strength, but it is a fact that the axle case has been stiffened lately, so a simple tie rod has been devised to fit on old Fords. This can be attached with a spanner only, and in a very few minutes, while the rod is really two long bolts, so that there is a flexibility at the center part where the heads of the bolts socket into the pad under the differential case.

The front axle attachment consists of a brace to tie together the middle of the axle and the apex of the radius rods or stays, the idea being that the latter being springy in nature allows the axle to twist on its center line when meeting a bump on the road. Both these attachments are extremely cheap, and the least mechanical of persons could put them on correctly.—Auto Parts Co., Providence, R. I.

Carburetion Improver—This is a device designed to overcome the trouble caused by gasoline condensing and collecting upon the interior of the manifold, and operates by directing a stream of heated air along the inside walls of the manifold. A metal drum or muff is clipped to the exhaust pipe, and this has inside it a series of baffles, so that a small



Flange inserted in induction pipe to distribute hot air over walls

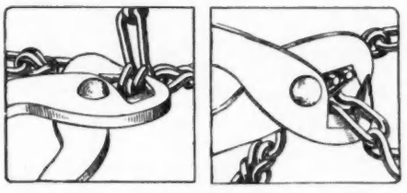


Anti-Rattle strips for Ford fenders

quantity of air admitted at a small orifice is compelled to travel up and down many times before it reaches the outlet. Thence it is taken to the "remixer," first passing a valve which is opened and closed by the interconnected carbureter throttle lever.

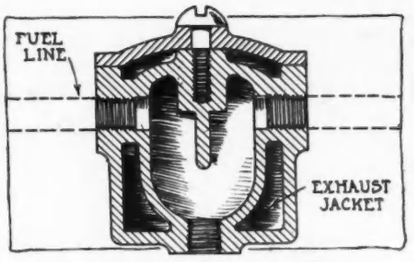
The valve is located on the edge of a flange which has to be inserted between the carbureter and the manifold, and the flange is hollow, being pierced on the inside with a number of small holes shown in the sketch. Through these holes the heated air is drawn, and it naturally rushes along the cold walls of the manifold, raising their temperature and so reducing tendency to condensation of gasoline. It is to be noticed that this device does not impose any restriction upon the manifold or in any way obstruct the passage of the gas to the motor.—Universal Shock Eliminator Co., New York City.

Eliminating Rattle—Often on an old car squeaks or rattles develop in the fenders, and when this happens it is usually difficult to effect a cure, owing to the springy nature of the parts in question. Often the best way to deal with the trouble is to have small strips of angle riveted or bolted in the corners where the fenders are attached to the other sheet-metal parts. To effect this repair on Ford cars with the least possible trouble specially shaped angle pieces are sold made from heavy pressed steel and enameled to match the fenders. — New Era Spring Specialty Co., Detroit, Mich.



Special pliers for Weed chain repairing

Weed Chain Pliers—However carefully one may handle tire chains the day will come when some repairs are necessary, when some new cross links have to be put in. The average man is not very fond of the job, and really it requires some skill properly to open and close odd links in a chain for the insertion of fresh lengths. The special pliers illustrated on this page have been devised by the Weed chain makers to render the job of replacing parts of Weed chains as simple as possible, since they will firstly open the hook on a cross-chain end to allow the old one to be detached, and they can then be employed for closing the hook on the new piece which has been put in place. The sketch shows how different parts of the plier jaws are used for these two operations. — Weed Chain Tire Grip Co., Bridgeport, Conn.



R. O. C. gasoline warmer

Gasoline Preheater—One of the simplest of devices for warming the fuel on its way to the carbureter is that illustrated here, and the design is such that the fitting also acts as a trap for dirt. Gasoline passes through the center bowl, which is surrounded by an exhaust jacket, a flexible pipe serving to make connection with the manifold. It is recommended that the preheater be mounted as close as possible to the carbureter. At the bottom of the fuel bowl a tap is screwed in so that water or dirt which settles can be drawn off, and the top of the jacket is removable so that any carbon or gummy deposits can be removed from the jacket. At the outlet from the jacket there is a second cock so that the heat can be turned off, if desired, in very hot weather. R. O. C. Sales Co., New York City.

Catalogue and Pamphlet Review

Clocks — A recent addition to the Johns-Manville line is a well-made clock supplied with two styles of mounting for the cowl board, either flush or projecting. It is handsome in appearance and guaranteed an accurate timekeeper.—H. W. Johns-Manville Co., New York City.

Radiometer—This is a new type of car heater, which uses instead of coal, exhaust gas, etc., a special chemical compound which is contained in a polished metallic case. The case is immersed in boiling water, and after removal the chemicals are said to retain heat for from 8 to 10 hours, depending upon the size of the heater. All forms and sizes are offered, and when once purchased no additional material is needed, the chemicals being said to last indefinitely.—Radiometer Co., Chicago.

Garage Turntables—An attractively illustrated booklet describes a great variety of Universal turntables for garage use and emphasizes their value to the dealer and to private owners with large garages of their own. Full instructions for fitting a Universal table are given, and the case for the device is put in a manner which is very convincing. It is, of course, undeniable that a turntable is of value to any garage, and this book besides pointing the argument shows that the installation is neither costly nor troublesome. — Canton Foundry & Machine Co., Canton, O.

Tire-Tube Protector—There are a variety of inner liners for tires on the market, but special claims are made for the Interlock, which encircles the tube completely and thus prevents it from blowing out, whatever the condition of the outer casing. It appears easy to fit and is dealt with tersely but fully in a handy little catalogue.—Double Fabric Tire Co., Auburn, Ind.

Zenith Carbureter—Some people have a little trouble in comprehending the action of the compound jet used in the Zenith carbureter, and in order to make its function clear to the least scientific motorist a book has been printed with ample diagrammatic illustration. It is written in simple language and is brief enough to cover the subject thoroughly without any waste of words.—Zenith Carbureter Co., Detroit, Mich.

Steel Stud Tread — The Armor tread is made of chrome leather and fits over the tire casing like a glove, protecting it completely from all puncturing substances and adding to its strength. The tread itself is furnished with a number of hardened steel studs, which cause it to give a good grip in the heaviest mud, and a lining of softer leather prevents the rivet heads from coming in contact with the rubber of the tire. Since there are no attachments such as buckles or straps the fitting is claimed to be easy, and it is obvious that great care is taken to make the leather a really good fit on the tire by using sufficient seams and insuring their neatness and strength.—Armor Tread Co., Hartford, Conn.

Special Gears for Fords—The Detroit Radiator & Specialty Co., Detroit, Mich., is offering differential driving gears with special ratios of 3 to 1 which will give a speed of 55 miles per hour and 2 4-7 to 1 which will give a speed of 60 miles per hour, it is said. The price is $15.

Tire Cases—A good tire case for the spare shoes carried on an automobile is well worth its cost by the protection that it gives to the rubber—there is more in it than the mere difference made to the appearance of the car, though this is also important to any man who values his vehicle. Nothing looks worse than a half used, dirty tire tied on a smart, new car. Several varieties of tire covers and some other useful things, such as a pressure gauge for pocket or cowl cupboard and a neat radiator cover for cold weather are dealt with. — Allen Auto Specialty Co., New York City.

Automobile Battery Charging is the title of a handbook of very small size, which deals fully with the use of a rectifier outfit in connection with an alternating current service. The particular apparatus it is designed to expound is the Cooper-Hewitt, prepared especially to suit the needs of owners of electric vehicles. A leaflet coming with this book deals with the other system of rectification by using a motor generator instead of a chemical process to convert the alternating current to the direct, which is necessary for battery charging. Both plants are made by the same great firm. —Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.